THE
EXTRA PHARMACOPŒIA

MARTINDALE
AND
WESTCOTT

VOL. I

NINETEENTH EDITION
REVISED BY
W. H. MARTINDALE

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THE EXTRA PHARMACOPŒIA

OF

Martindale and Westcott

REVISED

BY

. Harrison Martindale, Ph.D., Ph.Ch., F.C.S

NINETEENTH EDITION.

IN TWO VOLUMES.

VOL. I.

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1928.

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PREFACE.

Since the issue of the last edition of Volume I. of THE EXTRA PHARMACOPŒIA, in September 1924, new editions of several NATIONAL PHARMACOPŒIAS have appeared to which reference has been made in revising existing annotations in our pages. We may mention, for example, the PHARMACOPŒIA OF THE UNITED STATES, tenth decennial revision, 1926; the DEUTSCHES ARZNEIBUCH, sixth edition, 1926; the CODEX MEDICAMENTARIUS GALLICUS (*Pharmacopée Française*) NOUVEAU SUPPLÉMENT, 1926; the NEDERLANDSCHE PHARMACOPEE, fifth edition, 1926; and the PHARMACOPOEA SVECICA, tenth edition, 1925.

References in the book will also be found to the Agreements made at the Second International Conference for Unification of Formulæ, held at Brussels, 1925, and the Proceedings of the International Conference on Health Problems in Tropical America, 1924.

Finally we record our indebtedness to that ever-increasing guide to our study and laboratory work, the leading scientific periodicals; these we endeavour to follow assiduously, as published.

We are convinced, from a study of the doses, composition, and methods of preparation of medicamenta in various countries, that more complete International Unification is requisite to prevent errors in interpreting the wishes of a prescriber.

To take a simple case, as between the English-speaking races—a medical journal in this country prints an abstract of a paper from an American journal. The medicaments recommended may be of the U.S.P. standard or a semi-official preparation in that country—readily comprehended in the U.S.A.—but it by no means follows that the pharmacist here has the U.S.P. or the semi-official work to consult, or, indeed, has even the cutting from the English journal to assist him in giving a safe interpretation of the requirements. Similar difficulties arise no doubt conversely, *i.e.*, the prescription of a British medical man may present difficulties in the pharmacy abroad.

Note, for example, that Solutions of Morphine Hydrochloride are respectively 1, 2, and 3% in the B.P. '14, the French Codex and the Swedish Pharmacopœia. Again, Phosphorus Solutus P.G. VI. is 0·5% strength, while Oleum Phosphoratum of the *B.P.* and P. Svec. X. is 1%. Dover's Powder in Ph. Ned. is named Pulv. Opii Co., but Pulv. Opii Co. *B.P.* differs entirely in constituents. Many other instances of confusion could be cited.

We dwell upon these points at the outset to indicate the importance of defining, as we endeavour to do, International differences in strengths and standards of single drugs and chemicals and of compounded medicines. For References concerning recent observations of various Governments on International Unification *vide* F.I. in our *List of Abbreviations.*

While adding some thousands of relevant abstracts on Therapy, Chemistry and allied sciences, a very determined effort has been made with the blue pencil to condense the information.

Special attention has been paid to the arrangement of the type and paragraphs, to bring out the subject matter—diseases, etc. more clearly (see *e.g.*, *pp.* 481-490, 521, 650).

We will now consider a few of the additions to the book, and controversial matters which have had our attention.

Alcohol.—'**Surgical Spirit**,' of approved formula, has been used extensively, in view of its freedom from Pyridine, the objectionable constituent in Mineralised Methylated Spirit. No prescription is needed to obtain it and any desired quantity may be supplied.

On the other hand, the use of '**Industrial Methylated Spirit**' in dispensing and for surgical purposes—a further concession by the Board of Customs and Excise—is safeguarded by the Excise Authorities in a carefully drawn-up Regulation—No. 10 of the Methylated Spirits Regulations, 1925 (Statutory Rules and Orders, 1925, No. 1240). The requirements of this Regulation are clearly stated on *p.* 121. We commend them to the attention of Physicians and Surgeons, as in our experience too little advantage has been taken of this concession.

The employment of this type of spirit has hitherto been restricted to manufacturers and others (under Bond, if a certain quantity be exceeded), and it possesses the advantage of being uncontaminated with the denaturing ingredients required in the case of Surgical Spirit, which in themselves may be objectionable.

Isopropyl Alcohol might perhaps have proved a serious competitor of Rectified Spirits, but for a certain old-fashionedness and timidity on the part of some of those who have the power to create a demand. It came, however, promptly under the observation of the Customs and Excise, with the issue of the ISOPROPYL ALCOHOL REGULATIONS, 1927. We advocated it as a solvent for Medicinal 'Spirits' and Tinctures in 1924, and have still no reason to believe it is unsuited.

Activated Alkaloids.—In our last edition we expressed the opinion that 'activation' could be most reasonably explained by the view that in certain alkaloidal salt solutions, when in conjunction with Sodium Bicarbonate, the basic alkaloid is present.

We went further and formulated the reasonable theory that all alkaloidal salts, when injected into tissues, actually operate in the basic condition after double decomposition. In the case of Cocaine, Morphine, Quinine, Strychnine, etc., we extracted the bases from samples of blood so treated, and introduced certain solutions of bases for therapeutic employment.

Other workers in this country have followed the same line of thought by combining synthetic anæsthetics of the Ethocaine type with a weak base, such as Boric Acid. These borates, being the salts of a very weak acid, are readily hydrolised, so that aqueous solutions contain the basic compound.

The writer was impressed by the fact that Quinine salts, *e.g.*, the Hydrochloride and Acid Hydrochloride, are known to be very badly tolerated at the site of injection. Necrosis often follows, and it seemed possible to obviate these ill-effects by carrying the basic theory an additional step forward. **Quinine-Mannitol,** described in the *Lancet* i./26, p. 455, resulted. It is dealt with on *pp.* 732, 733 of this volume.

Antimony Potassium Tartrate for *bilharzia* infection is again dwelt upon. The method is good and safe, but the opinion is expressed that something must be left to skill in technique, and judgment as to suitability of the case. A number of favourable statements are embodied concerning what is now regarded as a standard treatment. No drug, it appears, has so great a parasitotropic action with so little organotropic effect in comparison.

Compounds of the nature of Urea-Stibamine have been used in kala-azar.

Argentum Proteinicum.—It may obviate confusion by remarking that the U.S.P.X. terms the compound containing some 8% of Silver of the Protargol type **Argento-Proteinum Forte** ('Strong Silver Protein'), while the name **Argento-Proteinum Mite** ('Mild Silver Protein') is adopted for the compound of the Argyrol type with 25% Silver—having regard to their relative therapeutic effects.

Arsenium : Organic Arsenic Compounds.—In spite of the general preference for Arsenobenzol, the Cacodylates continue to be in some favour as antisyphilitic remedies. In septicæmia, Sodium Cacodylate, in conjunction with Nucleinic Acid, is advised intramuscularly by Sir Thomas Horder.

The compound known under the trade name 'Stovarsol,' allied on broad lines to Atoxyl, has recently been much prescribed in amœbic dysentery, yaws, lambliasis, and in the early treatment of syphilis. There is an instructive literature relative to it (see *pp.* 192, 193), and its administration in conjunction with an Emetine compound, *e.g.*, in the form of Auremetine, has proved a success with amœbic dysentery carriers in this country.

Arsenobenzol.—The manufacture and testing of this and Novarsenobenzol are now subject to control by the *Therapeutic Substances Act*, 1925, and *Regulations*, 1927. In syphilis Arsenobenzol with Mercury is advised. Recourse is made to Sodium Hyposulphite injections where toxic effects are produced.

It may be observed that, although the *Deutsches Arzneibuch* describes Salvarsan and five Salvarsan 'Preparations' (Neosalvarsan, Sodium-Salvarsan, Silver-Salvarsan, Neosilver-Salvarsan, and Sulphoxyl-Salvarsan), in not a single instance is there a recommendation by the compilers regarding the dose to be used, or how the drug is to be employed.

Tryparsamide.—Accounts of the utility of this compound have been published in various parts of the world, but few papers have appeared here. It is given in large doses intravenously in trypanosomiasis; dimness of vision has however been recorded as a result. In general paralysis and tabes the statement is made that similar improvement might have been obtained with other Arsenicals.

Aurum.—A double Thiosulphate of Gold and Sodium originated in Denmark for tuberculosis has been thoroughly investigated under the guidance of the Medical Research Council and the findings are available. The Second Report says that there is definite hope of a drug along these lines, while Sir Almroth Wright doubts whether there is any evidence that the compound, as a chemo-therapeutic agent, is able to destroy the bacillus. On the whole, the accounts of toxic effects and deaths seem condemnatory.

Bismuth Compounds.—The alkali tartrate derivatives of this metal for injection are more potent or toxic, and more painful, than insoluble Bismuth products. Metallic Bismuth is the least toxic. It is furthermore not established that Bismuth is more effective than Mercury in the permanent cure of syphilis.

Calcium.—The role of Calcium in health continues to exercise the minds of therapeutists. Numerous notes are included on the intramuscular and intravenous injection of Calcium Chloride as a hæmostatic. Some of the recommendations in the American literature as to the strength of solutions appear to be too high.

Carbonis Tetrachloridum.—This chemical now finds a place in the body of the work—previously it was in the Supplementary List of Drugs. It has been attracting attention for hookworm infection, but it has also expellent powers on a variety of intestinal parasites. Much discussion ranges around its anthelmintic value in comparison with Chenopodium Oil. Combinations of the two drugs also receive support.

Coal Tar Derivatives.—This chapter is enlarged and re-written. Of the 'Flavine' bodies, Euflavine (Neutral Acriflavine) possesses advantages by reason of its diminished acidity.

The **Scarlet Colours** are more accurately defined. Confusion exists owing to differences in nomenclature.

With regard to **Phenylcinchoninic Acid**, occasional instances of bad effects (jaundice) are being reported. Probably, as Sir William Willcox suggests, this toxic effect only occurs where there is defective hepatic function. He adds, 'but possibly there is actual toxic action on the liver.'

Personally, we believe that patients under treatment may exceed the ordered dosage, as they do not realise the relative potency of chemicals of this description. Again, we think medical men may sometimes push the doses rather too far.

Reference is made to a combination of Atophan with Sodium Salicylate for injection and to several new derivatives of Phenylcinchoninic Acid, *viz.*, Methyl Phenylcinchoninate, the Allyl Ester, and the Para-Methyl Ethyl Ester. The last mentioned, *syn.* Tolysin, has been well spoken of in rheumatic fever.

Sodium Iodo-hydroxyquinoline Sulphonate, *syn.* Yatren is an old friend renamed. It appeared in our pages years ago, first under the name Loretin and later under that of Griserin. It has been largely prescribed for amœbic dysentery and is no doubt a good astringent, but Dr. L. P. Garrod has made some disparaging remarks regarding the intestinal antiseptics in general.

Gentian Violet. It is stated that this dye is specific for Gram + organisms and that only Staphylococcic infections are improved by it intravenously. Important details of a few cases of rheumatic carditis treated are given.

Coca.—The demand for this invaluable drug, in the introduction of which into Europe the late W. Martindale took so great a share, is adversely affected by the Dangerous Drugs Acts. On *p.* 334 there is an intimation from a medical man to the effect that he has been forty years in the Profession and has never seen an addict.

A dentist draws attention to the many thousands of successful extractions he has conducted with the aid of an anæsthetic containing Cocaine.

Amongst new Cocaine 'substitutes,' fresh notes are given concerning Tutucaine and Psicain.

Colloidal Metals.—Remarkable cases of Morphine addiction and alcoholism have been reported which responded to supervision and Gold injections. 'Tests' against control inert isotonic solutions coloured similarly to the Gold injections showed that patients treated with Gold picked up more rapidly and in general the cases were more successful (see also the Morphine Chapter, *p.* 561).

Colloidal Lead.—We have made a Colloidal Lead preparation experimentally and had it tested upon rabbits. Whether experiments on these small animals form any great criterion to go upon is to some extent doubtful, as 'specificity' plays a part, but the preparation was tolerated to a remarkable degree.

We give a full account of the whole theory of the Lead treatment of malignant disease. That Lead workers are comparatively immune from cancer seems certain. Out of 25,000 certified cases of lead-poisoning, an authority states there was not a single case of cancer. The utility of Lead clinically in cancer is *sub judice.* Quite recently Colloidal Lead Selenide and Lead Iodide have been favorably mentioned.

Ethyl-Hydrocupreine and ***Iso*-Octyl-Hydrocupreine** are respectively specific in action on the *pneumococcus* and on *B. diphtheriæ,* and one is glad to know that enough can be given by medicinal doses to clear the blood of these micro-organisms.

Ethylene, Propylene and **Acetylene** as anæsthetic gases and their limitations are discussed for convenience in the Chloroform chapter. Ethylene resembles Ether in many of its effects and Nitrous Oxide in speed, whilst it is less irritant to the respiratory tract than Ether but more so than Nitrous Oxide.

Digitalis.—The question of cumulative effect, discussed in the past, appears to be settled by a statement of the late Prof. Cushny.

We have long been looking for a good formula for a Digitalis preparation made direct from the leaf, suitable for injection. It so happens that the new *Pharmacopœa Nederlandica* provides details for making a **Liquor Digitalis ad Injectionem,** with *syn.* DIGISOL FOR INJECTION. We prepared a supply of this (the details of procedure are given on *p.* 396), using 1927 Digitalis leaves of our own growing and the finished preparation was examined in the Pharmacological Laboratory of the Pharmaceutical Society of Great Britain. The report was satisfactory, the lethal dose of the Dutch Liquor agreeing almost exactly with the figure stated in Ph. Ned. V.

Ergot.—The Liquid Extract of the British Pharmacopœia has been seriously criticised, and the formula will apparently need revision as the outcome of the work of Dr. H. H. Dale, Dr. J. H. Burn and others.

Filix Mas.—Confusion exists relative to the chemistry of the constituents of Male Fern rhizome. It is known that the oily Liquid Extract is not invariably operative against tænia.

We have been interested in the anthelmintic powers of the constituents of the rhizome from the veterinary standpoint in the treatment of distomiasis (liver fluke) in sheep. This affection has been exceedingly prevalent in some flocks owing to the wet climatic conditions of the last few years. The results, at the time of writing, point to the efficacy of a Filix Mas Extract *in conjunction with* a small dose of Carbon Tetrachloride. Foreign manufacturers maintain that they hold secrets regarding a definite derivative of Male Fern deemed alone to be operative, but this is not supported by the writer's investigations. The matter is important as a helping step to therapy in the human being.

Glucose.—Numerous statements are added, showing the value of Glucose injections intravenously in a variety of grave affections.

Gossypium.—In view of the enormous, one might say National, importance of the Artificial Silk Industry, which had as its birthplace the city of Coventry in the early years of the present century, we interested ourselves in the chemistry of **Rayon** (to give it the agreed designation).

We outline the various types of modified Cellulose and have devoted a certain amount of bench-work to applying the recognised tests for identification of 'Art' Silk, pure Silk, Wool and Mixtures.

Passing on from this, we give a brief account of **Cellulose Acetate and Cellulose Nitrate Solvents.** Paints and enamels of this type are rapidly coming into general use in the Arts.

The temporary digression from medicinal chemistry was intentional. It may be pointed out, as not generally realised, that the difficulties, from the maker's point of view, in the development of *purely medicinal* chemistry in this country are intense. The realm of synthesis is infinite but the scientist has no means of adapting an invented medicinal chemical to utility except through the goodwill and recommendation of the medical practitioner. Naturally, the best results are obtained when the physician himself inspires the laboratory worker.

We are sure the medical reader will not begrudge the few pages devoted to Cellulose products in view of the industrial importance of the subject.

Guaiacol, Iodine and Camphor.—A new injection of these combined ingredients has proved efficacious in rheumatoid arthritis and articular fibrositis.

Hexamine.—A treatment of cholecystitis by attempting to sterilise the biliary passage with large doses of this amine, and promoting biliary drainage, is described. It has been shown that Hexamine acts as a biliary antiseptic *in spite of the alkalinity of the bile.*

Hydrargyrum.—The absorption of Mercurials through the skin is a subject upon which we have experimented while working with Methyl-Aspriodine (*vide* Salicylic Derivatives).

Mercuro-Zinc Cyanide. In view of the Lister Centenary we give a brief note on Lord Lister's work under this heading. The late W. Martindale suggested 'Cyanide' and other antiseptics to Lord Lister.

Mercuric Chloride in Northern Ireland is a P1 Poison, *as also* are *Preparations of it.* This is a most reasonable regulation.

Pneumonia, staphylococcic infections, chorea, subacute rheumatism, chronic infective arthritis and encephalitis lethargica have been treated by intravenous injections of Mercuric Chloride.

Mercurochrome.—We commend the entire chapter on this compound to the attention of all those who are concerned with potent antiseptic preparations.

Bearing in mind that this dye contains nearly 25% of Mercury, we may confine our remarks here to three aspects of its utility.

In the first place, its usefulness lies in its local employment in solution as a substitute for Tincture of Iodine in surgery. It possesses the advantages of the latter without causing, as Iodine may, irritation, burning, or dermatitis.

Secondly, as a vesical injection, a 1% solution is tolerated by the bladder. It is rapid in effect in refractory cases of cystitis and pyelitis and the solution is also valuable in gonorrhœa.

Thirdly, the intravenous use in various grave infections must be considered. It is clear that some authorities (especially in the U.S.A.) have exceeded *the generally desirable dose and strength* of the injection. The writer had experiments specially conducted with it to confirm whether '8 to 15 Cc. of a 1% solution'—frequently mentioned in the literature, together with much larger doses—could be deemed a safe routine. The outcome of the investigation, including responses to a letter in the *Lancet* (December 10, 1927, p. 1267), conveys that 10 Cc. of a 0·5% solution should be regarded, as suggested by Dr. L. S. Dudgeon, as the maximum dose and strength to employ, and after two or three doses of this it is necessary to reduce the strength to 1 in 500. In affections of the nature of plague however, the bold dosage promulgated by Dr. Andrew Balfour, *e.g.* 20 Cc. of 1%, may be the only hope.

In conclusion, it may be a little naive to use the words 'hypersensitiveness to this Mercurial.' It is *relatively* non-toxic because it would be impossible to give 0·05 Gm. of an ordinary ionisable Mercurial intravenously, but the section on toxic effects should be studied. Furthermore Mercurochrome was originally introduced as a genito-urinary antiseptic—not for treatment of infections of the respiratory tract or accessory organs.

Novasurol, which follows, contains an even higher percentage of Mercury, *viz.* 34%. It is injected to produce profuse and rapid diuresis in the treatment of dropsies in cardiac and cardio-renal disease. Particular note should be taken of the portion from an authority's paper italicised on *p.* 491.

Iodum.—We often think it a pity that the mineral constituents of the sea-weed cast upon our shores cannot be utilised for the production of Iodine. At present the sea-weed is almost entirely thrown on the land as manure. The natural deposits of caliche in Chili and Peru are immensely rich in Iodine and the trade is a highly 'protected' one, with which the kelp-burner, regrettably, cannot compete.

Amongst the Organic Iodine Compounds the French preparation, Lipiodol, should be mentioned. Apart from its use in treatment, it has been administered by injection in the diagnosis of bronchiectasis and in a variety of procedures connected with the brain, Fallopian tubes, lachrymal passages, the lungs, spine, and so on.

Ipecacuanha.—Attention continues to be focussed on the alkaloid Emetine for amœbic dysentery and carriers of this infection. Contrary to a previously formulated theory, some now hold that Emetine kills *E. histolytica* by *direct* action. It is said that 1 in 50,000 is the highest concentration of Emetine that *E. histolytica* will tolerate for more than a short period.

The entire Emetine chapter has been rearranged to bring the various affections (apart from amœbic dysentery) that benefit from its employment, into a clearer sequence.

Emetine Periodide has the advantage of being insoluble in the stomach and hence causes no nausea. Results have been reported with it in schistosomiasis in Tropical Africa.

Auremetine.—A compound of the aniline dye, Auramine, with Emetine has been praised for amœbic dysentery. It formed the subject of a brief statement by Dr. J. Graham Willmore and the writer to the *British Medical Journal* (i./26,1625). A course of Auremetine (with Stovarsol added) has provided a high percentage of satisfactory responses.

Lobelia.—The chapter on *Lobelia inflata* includes an account of the alkaloid Lobeline—a powerful respiratory stimulant. It is stated to be of great service in restoring respiration after anæsthesia and to combat the effects of Coal Gas and Morphine poisoning.

Manganese.—The Thyroid and Manganese treatment of acute pneumonia is described.

Morphine Addiction.—A Departmental Committee's Report on Morphine and Heroin Addiction is dealt with on *p.* 1014.

Nutrimenta.—There is, if we may say so, a very large amount of information in this chapter. Amongst additions is '**Almata**,' described as a complete food made on scientific lines.

The Accessory Food Factors Section needed reorganising to bring it into line with the latest Vitamin theories. The fat-soluble factor of Cod Liver Oil, it is shown, can be separated into the growth-promoting Vitamin 'A' and the anti-rachitic Vitamin 'D.' A brief account of Vitamin 'E' is also provided.

We have given a concise account of the subject.

Irradiated Food.—Based on the observation that the anti-rachitic factor is produced not only by irradiating the skin but also by irradiation of food, preparations containing this factor, *e.g.*, **Radio-Malt**, have been brought to the notice of the Profession and the public.

Preparations of this kind are made by irradiating Cholesterol or similar alcohol with Ultra-Violet Light and incorporating the same in addition to 'A' in the form of 'Concentrate' in, for example, Malt Extract as vehicle. Such a preparation has obvious advantages over 'Malt and Oil,' the latter being unpleasant to the taste of many children.

Deplorable Defective Dietary.—Vitamins or no, we cannot miss this opportunity of pointing to the poor quality of some of the foodstuffs supplied to the masses of the population. This is merely a personal opinion of the writer. We quite understand that many think the quality of bread, etc., ideal at the present time in this country.

Oleum Chaulmoogræ.—Whether *Hydnocarpus* products are to be considered specific against *B. lepræ* and *Chaulmoogra* preparations are to be relegated to the 'dead stock,' as some would have us believe, is a controversy which interests us.

It is, so to speak, only the other day that *H. Wightiana* was classed with a number of other seed products as a spurious substitute for the genuine *Taraktogenos Kurzii* Oil.

Some years ago we divided the total acids of genuine Chaulmoogra Oil into two portions, the Sodium salts of which have been given respectively *per os*, and hypodermically and intravenously, as stated in our pages, with impunity, and as reports show, with satisfactory results. The soft fraction, in suitable dilution, can be injected without fear of embolism ensuing, and only quite recently we received reports from two Universities in Italy dealing with actual treatment, *vide p.* 609.

A preparation termed **Alepol** is a fraction of the Sodium salts of the fatty acids of Hydnocarpus Oil. The melting point of the Acid is *approx.* 32° C.

We must confess we have no brief for the employment of the Ethyl Esters of the acids of these oils.

Oleum Morrhuæ.—Numerous preparations are available claiming to contain the Cod Liver Oil Vitamins in concentrated form.

They are prepared by isolating the unsaponifiable fraction of the oil, and the method of procedure is stated in the chapter.

Opium Conferences have taken place under the League of Nations at Geneva, but the International position is still unsatisfactory. We give the situation to date, so far as we can gather it.

Pancreas—Insulin.—Great Britain has assumed the responsibility of keeping an International Standard Insulin, as the result of a Conference held under the League of Nations.

In a paper 'Diabetic Treatment Simplified' Sir F. C. Eve shows how the patient may watch his own case, measuring and charting daily variations in glucose excretion. The directions are certainly very helpful.

We have included a number of new abstracts from the extensive literature. Insulin medication extends now to ramifications apart from diabetes.

The potentialities of Synthalin and other Guanidine derivatives are still being investigated.

Paraffin and Agar-Agar Emulsion.—We provide a working formula for an emulsion of this type. The emulsion, if properly prepared, will show very little separation after months of storage, but the content of Agar cannot be increased much above 1% in a liquid preparation. **Paraffagar Capsules**, containing Liquid Paraffin and Agar only, are a novelty.

Peptone. Protein Therapy.—'Skin Tests' are further dealt with. A worker in Holland considers that 80% of asthmatics suffer from some form of allergy. He accuses the common mould, *Aspergillus fumigatus*, of forming allergens, to which he finds a large proportion of asthmatics are sensitive.

Peptone injections in non-specific immunisation are now proven remedies, the intramuscular technique being deemed as efficacious as the intravenous. Dr. F. Coke, an enthusiastic worker in this field, reviews his results in a thousand cases. Another authority, Dr. A. G. Auld, has contributed papers on Serum Peptone which are given *in precis*.

Phenolphthalein.—This chapter contains a concise account of the use of Sodium Tetraiodophenolphthalein in Cholecystography. The chapter embodies the results of two years' close following of Radiologists' reports, together with the necessary experiments to perfect the technique, and it is entirely new to Vol. I. of the *Extra Pharmacopœia*. The Chemical Characteristics, Methods of Assay, Preparation of Solutions, Toxicity, etc., are provided in a form for ready reference.

From the writer's experience he advises the compound to be employed by the oral route in preference to the intravenous. It is possible to give it by the mouth either 'plain' or coated so as to pass through the stomach and dissolve on reaching the alkalinity of the duodenum.

The best advice as to technique of administration is formulated, and we would mention the paper of Drs. P. G. McEvedy and J. E. Sheret (L. i./27,1120), see our *p.* 682, in which it is stated that

Slipules of the compound gave correct diagnosis in 92% of 100 consecutive cases.

We understand that the intravenous diagnostic method has practically dropped out of service in the U.S.A. Relatively very few reports of toxic effects from taking the chemical orally have appeared. The literature on the subject is enormous and two or three pages of concise abstracts are printed.

The allied Bromine compound, Sodium Tetrabromphenolphthalein, also seems to give quite good results *per os*, but on scientific grounds it cannot be expected to provide so good a shadow.

Potassium Iodide.—The 'Goitre Problem' continues to attract much attention in certain countries and in districts in England where the disease is endemic. The Swiss Goitre Commission has fixed the proportion of Iodine to be added to table salt. It has indeed been recently suggested that the Chlorination of the London Water supply may possibly eliminate or cause a deficiency in natural Iodine.

Quinidine is at least as efficacious as Quinine in malaria. This is the gist of a special Medical Research Council Report.

The treatment of auricular fibrillation with the alkaloid receives a commendation.

The **Quinine** Chapter contains a résumé of the chemical substances used for contraception.

The entire chapter has been remodelled in various ways, to make the subjects dealt with more easily found.

Quinine-Mannitol has already been referred to. We hold that there must be utility in basic alkaloidal solutions.

Quinine-Urethane is well spoken of for injection in varicose veins.

The discussion around Quinine injections in general for malaria still rages to and fro—we note one author says its injection hypodermically or intramuscularly is a formidable procedure. Sir Leonard Rogers says *Cinchonine* is more rapidly absorbed and produces less pain and no induration. This is certainly interesting.

It has been proved by Professor Warrington Yorke, Lt.-Col. S. P. James, and others, that Quinine given to a patient just previously to his being bitten by an infected mosquito is of no avail in preventing or delaying onset of the attack. Other remedies may prove effective.

Cinchona Febrifuge offers one of the cheapest anti-malarial measures to prescribe for the use of natives in India and elsewhere in wide-spread epidemics.

Resorcin.—**Hexyl-Resorcin** has a page devoted to it. It is an efficient urinary antiseptic, acting in either an acid or alkaline medium. Chronic *B. coli* and *Staphylococcus* infections are combated with it, but it acts best in early cases. *B. coli* infections are resistant—in these the compound must be taken over a lengthy period.

Saccharum.—Here also, as in the case of Rayon, we have departed a little from therapy. The inception of the British Beet Sugar Subsidy interests us on the basis that every possible commodity needed by the community should be grown or produced within our shores. Further, on scientific grounds, the work should be fostered. Crops have been produced on what was previously practically barren soil, after it had been adequately manured. The figures, with which the Ministry of Agriculture and Fisheries kindly assisted, are very instructive. Note the remarkable increase in tonnage of beet delivered to the factories and in total production of sugar. Even though the subsidy paid increases *pro rata*, we may as well grow what we require.

Salicylic Derivatives.—**Methyl-Iodo-Aspirinate** has been introduced under the name METHYL-ASPRIODINE. It has the characteristic of melting almost at body temperature. In temperate climates it is therefore solid or waxy, whereas in tropical latitudes it is liquid. Being miscible with fats and other organic solvents, it is suitable for inunction in painful rheumatic affections and as a general local analgesic. It contains the equivalent of 56·3% Aspirin and 39·7% Iodine; it is more effective than Methyl Salicylate, of which it can be viewed as a derivative. The high percentage of Iodine is no doubt of importance.

The fact that the Salicylic radical cannot be promptly traced (within a day or so) in the urine, opened up a useful piece of research with other well-known medicaments in comparison (see *p.* 87).

Data are given on Sodium Salicylate for injection in varicose veins.

Sulphur.—Chronic rheumatism has yielded to intramuscular injections of a solution of Sulphur in oil, in the hands of several workers.

Ureides.—The dangers of the Barbituric derivatives have been dwelt upon at length by a number of authorities. Sir William Willcox writes that the average dose of **Veronal** in fatal cases is 50 grains, and as little as 10 grains has caused death. It is an insidious drug with evidence of cumulative action. Its dangers are not adequately recognised. We commend the reports on *p.* 818 to our readers.

A little further on, on *p.* 823, the toxic effects of **Luminal** are dealt with.

Valerian.—It has been said in France that it is possible to produce a Valerian preparation free from odour. We cannot confirm this, but a formula for an Elixir Valerianæ et Bromidi, employing a 'recent' Valerian Extract, is worthy of mention.

SUPPLEMENTARY LIST OF DRUGS.—Additions to this section include **Ephedra Vulgaris**, and its alkaloid **Ephedrine, Nasturtium Officinalis** preparations, and **Thallium Acetate.**

VACCINES AND ANTITOXINS.—This portion of the book has been re-written to bring the data into line with the latest developments in respect of, *e.g.* :—

- **Catarrhal Vaccine.**
- **Diphtheria Antitoxin.**
- **Anti-Dysentery Serum.**
- **Gonococcus Vaccine.**
- **Anti-Streptococcus Serum.**
- **Scarlet Fever Antitoxin** (including the Schultz - Charlton Reaction).

Hay Fever Vaccine.
Influenza Bacillus Vaccine.
Pneumococcus Vaccine.
Strepto. Rheumaticus Vaccine.
Anti-typhoid-paratyphoid Vaccine ('T.A.B.') and modifications for cholera and Malta fever.
Staphylococcus Vaccine.
Tetanus Antitoxin.
Tuberculins and Tubercle Vaccines (as defined by the *Therapeutic Substances Act and Regulations*).
Vaccine Lymph.

ANIMAL ORGANOTHERAPY.—It suffices merely to point to a few items of this chapter which have been extended.

The **Liver Diet** for pernicious anæmia is carefully summarised, with a number of 1927 references for those who desire to consult the original papers. Pharmaceutical preparations of Liver, both in the liquid and desiccated form, are available.

Ovarian Hormone. The method of Allen and Doisy and other workers is dwelt upon. From the ovary at least three different substances can be obtained.

'Pituitary (Posterior Lobe) Extract'—to give it the correct name required by the *Therapeutic Substances Act Regulations*—is now standardised to 10 units per Cc. It must also be tested for sterility, and the acidity of the liquid is to be within certain *p*H values.

Thyroid. It is gratifying that an Englishman, C. R. Harington (who received the Harrison Memorial Prize for his work), has cleared up the chemical constitution of **Thyroxin.** The methods of its isolation and its synthesis are briefly summarised.

SCHEDULE OF POISONS.—Since the last edition of this volume several important additions and alterations have been made relative to Alkaloids, Barium salts, Cannabis, Digitalis and Strophanthus constituents, etc.

We have affixed our [P1] and Ⓟ signs to the names of all poisons included in our pages to indicate respectively Parts I and II. The Schedule, revised to date, is given on *p.* 998.

We have found some difficulty in being logical in the exact interpretation of the wording of the Schedule. In such instances we have erred on the side of safeguarding the interests of the public. The only notable exception which we can recall is the position of *Preparations of Mercuric Chloride* in the British Schedule. These we have assigned to Part II., following the instruction prescribed by the Acts. We have frequently drawn attention to this anomaly from the common-sense point of view.

THE LABELLING OF POISONS ORDER came into force in 1926—this is detailed on *p.* 1002.

THE DANGEROUS DRUGS ACTS are now preceded by a helpful summary on *p.* 1004 to act as a guide both for doctor and chemist.

Certain amendments were needed in the Acts themselves to correct confused points, *e.g.*, on *p.* 1007 it is made clear that in the case of *B.P.*, etc., preparations it is only necessary to state the amount of the *preparation*, not the total amount of the Dangerous Drug.

The Dangerous Drugs Act 1925 is given on *p.* 1014, but this is not in operation.

THERAPEUTIC SUBSTANCES ACT 1925.—This Act (*see p.* 1023) opens up a type of control and regulation which is entirely new to Pharmaceutical Chemistry and the allied avocations. It regulates the manufacture, sale, and importation of Vaccines, Sera, toxins, antitoxins and antigens, Salvarsan, Insulin, and preparations of the Posterior Lobe of the Pituitary body.

We give the salient and relevant portions of the Act. A manufacturer, before being granted a licence to make, for example, a Pituitary preparation, must permit an inspection of his premises.

In addition, all the needed assay and testing arrangements required are controlled by the Act.

THE THERAPEUTIC INDEX OF DISEASES AND SYMPTOMS has been reorganised in an attempt to divide each section into two parts—the first, in ordinary type, dealing with internal remedies and those injected, while local external remedies are now all in italics in the second part, but the reader must exercise caution, as instances occur where it is difficult to ' place ' a drug or chemical and reference should be made to the relative page.

A large amount of new matter is added to this section.

TRADE MARKS AND PATENTS.—These have had a thorough revision. The Registers have been consulted to date to ascertain the status of a ' Mark.'

The above notes occur to us on glancing over the MSS. pages after nearly four years of revision.

The writer acknowledges with gratitude numerous responses to his requests for assistance and permission to utilise information from medical men, and he would be obliged for suggestions at any time from specialists to improve the data available on any subject.

He records his great appreciation of the help given him by W. K. Fitch, Pharmacist, in pharmaceutical matters of divers kinds, by S. Back, B.Sc., in chemical laboratory work, and by Sydney Ward, for secretarial work in connection with this edition.

We would like now to pass for a few lines to other relevant considerations.

One frequently comes across instances of intolerance of customary doses of some of the ' modern ' chemicals, and of these a small proportion may be due to individual susceptibility. These cases cause grave anxiety to all concerned.

It would appear also, that a patient, weakened it may be, by a bacterial or protozoal infection, simply cannot stand the shock or other effects of an injection, say, of an Antimony compound, or a Mercurial or Arsenical. The dose merely tips the balance against the man's life.

There are, however, many cases of intolerance which cannot be explained in this way and these appear to be caused by excessive dosage.

Anyone who has followed the trend of Therapeutics during the last two or three decades will recall that numerous synthetic remedies introduced with specific instructions were found to be dangerous in the doses and courses of doses specified, and the doses ultimately had to be reduced. Let us consider a few which we have in mind.

Sodium Arsanilate fell into disrepute, with the warning that disturbance of vision should be looked for. In plain English it turned some patients blind.

The Acetyl derivative of it proved no better. Blindness after its use in trypanosomiasis was reported 20 years ago, but even to-day enormous doses are mentioned in the German literature.

Arsenobenzol. No one would give the initial doses originally advised (0·6—0·8 Gm., or more). The maximum single dose generally used now is 0·4 Gm. (The P.G. VI., as already conveyed, vouchsafes no opinion as to dose.)

In addition, there have been serious reports concerning a number of the newer organic Arsenicals, which have been advised in truly remarkable doses.

The organic *Bismuth* compounds, so recently introduced, are now questioned—toxic effects are continually being reported.

Amongst the *Coal Tar Derivatives* difficulties with *Phenylcinchoninic Acid* as already dwelt upon, are only appearing after 15 years of relative tolerance.

From reading the accounts of the *Lead* treatment of cancer, and from experiments which we have had conducted, it is clear that a small animal like a rabbit—well known to be tolerant of remarkable amounts of common poisons—will stand massive doses of this metal in the form of Albuminate. These doses would, we think, be quite impossible, if transposed weight for weight, to use in man.

(Quite incidentally, and curiously enough, we have been unable to trace any record of the toxic dose of *Boric Acid* intravenously, either in man or small animals.)

The *Mercurials* bring to mind two new organic compounds, one with potent diuretic properties—the dosage of which has been seriously criticised—and the other Mercurochrome, to which reference has already been made. The writer has shown that the dose of this compound deduced from animal experiments to be dangerous in man has been *exceeded* clinically in the case of this antiseptic, but it is fortunate we are in possession of authoritative instructions—the result of *clinical* trials in man—which make for safety.

The *Iodised and Brominised Phenolphthalein* compounds yield another instance of difficulty. Many medical men, we believe, would not utilise these compounds by the intravenous route.

The development of a new malaria specific which has been discussed seems also to come into the category—the doses appear now to be on the downward tendency.

Thallium Acetate has recently been advised for epilation in ringworm, though the amount producing this effect was stated more than twenty years ago. The chemical was employed in the past for other affections. Within a few weeks of its *re*-advocacy the medical journals contained condemnatory articles.

Many of the bad effects with the new drugs to which we have referred, could, we suggest, be explained by reason of the dosage and effects having been worked out by observation on small animals only. Pharmacology, as generally understood, is less than 50 years old.

Our contention is, and we submit that it is worth careful thought, that a safe dose for a man *can not* be arrived at by analogy with the small doses used in trials upon animals. We notice that Sir W. Pope made some similar remarks on comparisons between animals and man before a Ministry of Health Committee appointed recently to enquire into the possible dangers of ' Ethyl '.

Most decidedly, in our experience, results from minute creatures like mice in respect of new chemicals whose physiological effects are practically unknown, are misleading. In these animals not only small doses but extreme dilutions have to be used for the purpose.

We are aware that apparently concordant results in routine toxicity tests of Arsenobenzol are obtained with them.

It has been known for years that a dose per kilo of cat cannot be transposed to a dose for man, but a useful purpose will be served by elaborating and ventilating the information.

A well-versed pharmacologist, to whom we put the difficulty, seemed to meet the case well by the following guarded rejoinder: "The question you raise is a very difficult one, and I do not think that anybody could lay down a standard routine. Each case would have to be judged on its own merits. As a general principle, of course, one would start the experiments with relatively small doses, running risk on the side of inefficacy rather than of dangerous toxicity to begin with, and then feeling the way cautiously. It has never been sufficiently realised, I think, that the clinical trial, properly conducted, ought to involve a research as careful and elaborate as the preliminary laboratory demonstration of a promising activity."

Another well-known pharmacologist favoured progress from the animal experiments to man by assuming that tolerence to the drug is proportional to the rate of catabolism ; this is deduced from Meeh's formula. The formula is stated to be applicable within certain rather vague limits. We have worked with it in respect of several new compounds, but it is by no means an infallible guide. The Dose Calculation Tables (*pp.* xxxii, xxxiii) will be found useful.

An additional consideration of great importance is that the therapeutic dose of many new synthetics—certainly it is so in the case of the Veronal group—is dangerously *near the lethal dose*, and again, the margin between the two types of dose varies with individuals. It is admitted that a simple and safe Bromide mixture may not afford the relief given by one of these deep hypnotics, but we cannot resist remarking that the whole bottleful of Bromide mixture would not kill the patient, whereas nowadays he is handed a phial containing ten or more small tablets, and these are deceptive owing to their diminutive calibre. If he slightly oversteps the dose directions, the result may be deplorable.

We have had propositions put to us that we should assist in procuring the removal from Part I. of the Poisons Schedule of a Ureide compound containing 28% of Veronal, used as a calmative soothing anti-neuralgic, to Part II., with a view to its being more readily obtainable by the public. The Ureides, it will be recalled, were removed from Part II. to Part I. in 1918.

In complete opposition to such a proposal, we hold that not only the medical man but the patient, and the public generally, should be warned as to the potency of these remedies. The patient at present does not know that a slight increase in quantity may be harmful. He thinks these preparations are merely sleep-inducers of the mildness of Bromide.

So far as the Ureides in general are concerned, we hold no brief for them. We devote more than a page to Veronal poisonings and the dangers of the Barbituric derivatives.

The moral of the whole issue is that data from experiments on small animals are only rough guides to go upon and the accumulated evidence of the last 20 or 30 years (especially the recent ones) supports our conviction.

We do not want to labour our thesis. We have naturally no fight at all with the pharmacologist. We know the results he obtains in certain types of investigation as between animal and animal, but he can *not* determine safe doses for man by reference to animals—our fight is particularly with the producer and the exaggerator of claims. We wish to safeguard all concerned against ill-advised therapy.

We endeavour to help our readers on this difficult dangerous dose question—note, for example, the cautions at the commencement of the Intravenous Dose Table; the table has been enlarged on this occasion.

It is a pleasure to us to know that the *Extra Pharmacopœia* is largely consulted by the medical man and the pharmacist for information of this kind, and we sincerely trust that the pages may not be found wanting.

We hope that our annotations on Chemicals and Drugs and those of other pharmacists, collated during the last four years, may be of some service to the Pharmacopœia Commission or other body responsible in the future for the revision of the British Pharmacopœia.

In closing the labours regarding this Edition, the writer desires to mention the names of two men who are no longer with us and who were his friends of a lifetime—Sir Dawson Williams, late Editor of the *British Medical Journal*, and Mr. S. W. Woolley, late Editor of the *Chemist and Druggist* (London). Both these men did much on behalf of British science and industry.

W. HARRISON MARTINDALE.

12, New Cavendish Street,
London, W. 1.
June, 1928.

The Author would welcome any suggestions regarding the subject matter or arrangement of the work, from Medical Men Pharmacists, or Analysts

ABBREVIATIONS.

When the reference is to a periodical, the number put first is the number of the volume; then follow the last two figures of the year, and the last number refers to the page, thus, B.M.J. i./28,500.

A.R.—List of Reagents for Analytical Purposes prepared by a Special Committee appointed by the Councils of the Institute of Chemistry of Great Britain and Ireland and the Society of Public Analysts and other Analytical Chemists.—London, 1915.

Allen.—Allen's Commercial Organic Analysis.—Edited by H. Leffmann, M.A., M.D., W. A. Davis, B.Sc., A.C.G.I., and S. S. Sadtler, S.B., Fourth Edn., 1909-1917, 9 vols.; also Fifth Edn. of Vols. I. to IV. (1924-5); Vol. V. (1927); Vol. VI. (1928).

Am.Jl.Ph.—American Journal of Pharmacy.

Arch. Radiol.—Archives of Radiology and Electrotherapy of the British Assoc. for Advancement of Radiol. and Physiother. See also 'J.R.S.'

B.C.A.—British Chemical Abstracts. Branch A—pure Chemistry—is issued monthly with the Journal of the Chemical Society, London.

B. & C.P.—British and Colonial Pharmacist, London, previously B. & C. D. —British and Colonial Druggist.

B.M.J.—British Medical Journal, London.

B.M.J.E.—British Medical Journal Epitome.

B.P. '14.—British Pharmacopœia 1914 (previously indicated, *Off.*).

B.Pt.—Boiling Point.

B.P.C.—British Pharmaceutical Codex, 1923.

B.P.C. 1894 or 1901—Formulary of the British Pharm. Conference.

Barnett.—Preparation of Organic Compounds—E. De Barry Barnett (Churchill), 1920.

Batty Shaw—Organotherapy, or Treatment by means of preparations of Various Organs, H. Batty Shaw, M.D., F.R.C.P.

Bayliss.—' The Colloidal State and its Medical and Physiological Aspects.' —by the late Sir W. M. Bayliss, 1923.

Beddoes.—Syphilis, Its Diagnosis, Prognosis, Prevention and Treatment, T. P. Beddoes, 1909.

Berl. Klin. Woch.—Berliner Klinische Wochenschrift, Berlin.

Bosanquet.—Serums, Vaccines and Toxins in treatment and diagnosis, W. Cecil Bosanquet, M.D., 3rd Edition, 1916.

Brompton H.—Pharmacopœia of the Hospital for Consumption and Diseases, of the Chest.—Brompton, Eleventh Edn., 1928.

Brooke.—Tropical Medicine, Hygiene and Parasitology, by Gilbert E. Brooke, 1920.

C.D.—Chemist and Druggist, London.

C.H.W.—Formulæ of Chelsea Hospital for Women, 1900.

C.L.T.E.—Central London Throat and Ear Hosp. Pharm., 1924 and earlier.

C.R.—Proposed changes in the British Pharmacopœia, in accordance with the International Agreement for the Unificaton of Pharmacopœial Formulas for Potent Drugs signed at Brussels, Nov. 29, 1906, from a report to the Pharmacopœia Committee of the General Medical Council. Adopted by the Committee of Reference in Pharmacy, March 4, 1907. This Committee issued further reports in 1908, 1910, 1911. *cf.* F.I.

C.X.—Charing Cross Hospital Pharm. 1922.

Can. Form.—The Canadian Formulary of Unofficial Preparations.

Chemical Abstracts.—Published by the American Chemical Society.

Chininum.—Chininum Scriptiones Collectæ, Bureau for increasing the use of Quinine, Amsterdam, 1925.

Clin. Jl.—Clinical Journal, London.

Colyer's Dental Surgery and Pathology.—Fifth Edn., 1923 and earlier issues (previously Smale and Colyer's Diseases and Injuries of Teeth).

Comptes Rend.—Comptes Rendus Hebdomadaries des Séances de D'Académie des Sciences.

Cushny.—Text Book of Pharmacology and Therapeutics, by the late Arthur R. Cushny, M.A., M.D., F.R.S., 8th Edition, 1924.

D.M.W.—Deutsche Medizinische Wochenschrift. Leipzig.

🄳.—**Drugs or preparations coming within the scope of the** Dangerous Drugs Acts, 1920 and 1923. (The 1925 Act is not yet in operation.)
Dawson Turner.—Radium, its Physics and Therapeutics, by Dawson Turner, B.A., M.D., 2nd Edition, 1913.
Digitalis Assay.—W. H. Martindale. A communication to the Pharmaceutical Society of Great Britain, 1913. (H. K. Lewis & Co., Ltd.)
Disp.—Art of Dispensing, published by *The Chemist and Druggist*, London, 10th Edition, 1926.
Dixon.—Manual of Pharmacology, 1925, W. E. Dixon, M.A., M.D., F.R.S.
E.—*Pharm.* of Evelina Hospital, Southwark, 1906.
E.G.A.—Elizabeth Garrett-Anderson. Hosp. Pharmacopœia, 1926 and earlier Edns., Euston Road, London (formerly New Hospital for Women)
E.L.—Pharm. of East London Hospital for Children, 1915.
Ec.Prod.I.—Economic Products of India, 1889–96.
Ed.M.J.—Edinburgh Medical Journal.
Edition XVIII.—Eighteenth Edition of this work (1924). For References and comments unavoidably deleted.
Emery.—Clinical Bacteriology and Hæmatology, W. D'Este Emery, M.D., B.Sc., 6th Edition, 1921.
Evans.—Evans' Analytical Notes.—Evans Sons, Lescher and Webb, Ltd., London and Liverpool.
F.E.—Farmacopea Española Septima Edicion, 1905. Madrid.
F.I.—Formula Internationalis, International Agreement for Unification of Formulas signed 1906—*cf.* C.R. *antea.* Also Agreements made at *Second* International Conference at Brussels 1925 as stated in Final Report and Preliminary Draft. (P.J., ii./25,547; i./26,56), see also P.J. i./26,41,42,294; ii/26,734; ii./27,372.
F.N.—Formulaire des Medicaments Nouveaux. Bocquillon-Limousin.
F. Norsk.—Den Norske Farmakopϕ, 1913. Norwegian Pharmacopœia.
Fr. Cx.—Codex Medicamentarius Gallicus, Pharmacopée Française. Paris, 1908, Matson et-Cie, 120, Boulevard Saint Germain.
Fr. Cx. Supp. I. to V.—Supplement I (1920) to V, (Official from Apl. 5,26); also 'Nouveau Supplement,' 1926, issued in book form.
Finnemore.—Essential Oils, their Chemistry and Technology.—H. Finnemore, 1926.
G.—The Essentials of Materia Medica and Therapeutics—Sir A. E. Garrod, M.D., and Sir N. J. C. Tirard, M.D., 13th Edition, 1890.
G.H.—Pharmacopœia of Guy's Hospital, 1916.
G.N.C.—Pharm. Gt. Northern Central Hospital, 1908. (See also R.N.H.)
Garrod.—Sir A. E. Garrod, D.M., M.A., Inborn Errors of Metabolism, 1923, and other communications.
Gehe.—Gehe's Codex der Bezeichnungen von Arzneimitteln, 4th Edn. 1926 (Dresden).
Ghosh.—Treatise on Materia Medica and Therapeutics, by the late R. Ghosh, L.M.S., Cal. Univ. Edited by B. H. Deare, Lieut.-Col. I.M.S 11th Edition, 1927 (and Abstracts from earlier Editions).
Glyn-Jones.—The Law of Poisons and Pharmacy. Sir W. S. Glyn-Jones.
Gould.—The Practitioner's Medical Dictionary, by G. M. Gould, A.M. M.D., 3rd Edition Reprint, 1924.
Gradwohl and Blaivas.—"The Newer Methods of Blood and Urine Chemistry," by R. B. H. Gradwohl, M.D., Director of the Gradwohl Laboratories, Chicago and St. Louis, and A. J. Blaivas, St. Luke's Hospital (Chemical Laboratory), New York. Sec. Ed., 1920.
Gt. Orm. H.—Gt. Ormond St. Hosp. Children Pharm., 1927.
Green.—Green's Encyclopedia of Medicine and Surgery
H.—Text Book of Practical Therapeutics, Hobart Amory Hare. 19th Edition, 1925 (and abstracts from earlier Editions).
H.W.—W. Hale White, M.D., Materia Medica, Pharmacy, Pharmacology, and Therapeutics, 19th Edn., 1927, and previous issues.
Hager.—Handbuch der Pharmaceutischen Praxis, 1907 and 1925.
Hewlett.—Serum and Vaccine Therapy, T. R. Hewlett, 2nd Edition, 1910, also Bacteriology, 8th Edition, 1926.
Hutchison.—R. Hutchison, M.D., F.R.C.P., Food and Principles of Dietetics, Edward Arnold, London, 4th Edition, 1916.
I.C. Add.—Indian and Colonial Addendum (1900) to the B.P., 1898.
I.D.C.—Indigenous Drugs Committee, 2nd Report, Simla, 1909. Third Report, Calcutta, 1916.

I.M.G.—Indian Medical Gazette.

I.V.—Iodine Value.

Int. Conf. Trop. Am.—Proceedings of the International Conferenceon Health Problems in Tropical America, 1924, Published by the United Fruit Co., Boston, Massachusetts.

Int. Cong.—VIIth International Congress of Applied Chemistry, London, May, 1909 (papers read at); also VIIIth Congress. Washington, 1912.

J.C.S.A.—Jl. of the Chem. Soc. Abstracts. London. See also B.C.A.

J.C.S.T.—Journal of the Chemical Society Transactions. London.

J.R.S.—Journal of the Roentgen Society, London, and as from Jan. 1924 "The British Jl. of Radiology, Rontgen Society Section, incorporating the Jl. of the Rontgen Society." See also Arch. Radiol.

Jl. A.M.A.—Journal American Medical Association, Chicago.

Jl. Am. Ph.A.—Journal of the American Pharmaceutical Association.

Jl. Ph. and Exp. Ther.—The Journal of Pharmacology and Experimental Therapeutics. Edited by J. J. Abel (The Johns Hopkins University. and Walter E. Dixon (University of Cambridge). Baltimore and London)

Jl. R.A.M.C.—Journal of the Royal Army Medical Corps (Mthly.).

Jl. R.N.M.S.—Journal of the Royal Naval Medical Service (Qtrly.).

Jl. Trop. Med.—Journal of Tropical Medicine and Hygiene, London.

K.C.H.—King's College Hospital Pharmacopœia, 1927.

Knox.—Radiography, X-Ray Therapeutics and Radium Therapy, by Robert Knox. 3rd Edition in 2 vols. 1919. (New Edn. Vol. 1, 1924.)

L.—The Lancet, London.

L.H.—Pharmacopœia of the London Hospital, 1925 and earlier Edns.

L.I.P.—London Insurance Pharmacopœia, issued by the Panel Committee for the County of London, 1925.

L.L.—London Lock Hospitals Pharmacopœia, 1919.

Lewis Jones.—Medical Electricity. Lewis Jones, M.D. 8th Edition 1920, and other communications.

Luff.—Pathology of Gout, 3rd Edition, 1907, Arthur P. Luff, M.D.

M.—Annual Report of E. Merck.

M. & R.—R. Muir, M.A., M.D., and J. Ritchie, M.A., M.D., Manual of Bacteriology, 9th Edition, 1927.

M.A.—Medical Annual.

m.a.—Milliampere.

M. Am.—Merck's 1907 Index (New York).

M. Arch.—Merck's Archives. New York.

M.P.C.—The Medical Press and Circular, London.

M.Pt.—Melting Point.

M. Index.—Merck's Index, 1911, also (Fifth Edn.) 1927, Darmstadt.

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P.J.F.—Pharmaceutical Journal Formulary.

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✱ In connection with a text heading signifies that the name which it precedes is a British Registered Trade Mark, *e.g.*, ✱Exalgine. The ✱ is only applied to the principal heading and is not repeated throughout the book.

WEIGHTS AND MEASURES.

The British Pharmacopœia (1914) employs the Metric System of weights and measures for pharmaceutical and analytical purposes, but for doses gives the dual system, namely, the Metric and Imperial Weights and Measures. A preparation made according to either system will contain approximately the same proportions of ingredients.

The temperature 16·7° C. (62° F.) is employed for measuring vessels used in the **Imperial System**—this applies to *doses* only so far as the B.P. is concerned. The temperature in question is authorised by the Weights and Measures Act, 1879. For determining **Specific Gravities** the temperature 15·5° C. (60° F.), is used in the British Pharmacopœia (U.S.X. employs mostly 25° C.).

The Board of Trade, May 1, 1908, recognised, as stated in the British Pharmacopœia, the word 'mil' as a short official designation for the millilitre, 'decimil' for $\frac{1}{10}$ of a millilitre, and 'centimil' for $\frac{1}{100}$ of a millilitre. These terms are used in stating 'metric' doses in the British Pharmacopœia, but in paragraphs relating to Analysis and in those relating to the manufacture of galenical preparations the term 'millilitre' is (officially) employed.

In our pages formulæ are given in 'proportional parts,' solids by weight, and liquids by *measure*, as the dispensing of liquids in Great Britain is always conducted by measuring. Exceptions to this rule are always made clear in the text. In those, therefore, in which 'proportional parts' are used, the quantities of solids and liquids may be taken respectively in grammes and cubic centimetres, ounces and fluid ounces, grains and (to be strictly accurate) grain measures, but minims in place of the latter will often be used, and only cause one-eleventh *minus* error.

In the body of the work (but not in the secondary List or Index) the approximate doses of each drug and preparation in terms of the metric system follow those of the Imperial System. For all practical purposes, a fluid drachm may be considered as 4 cubic centimetres; 60 grains as 4 grammes; the avoirdupois ounce (about 28½ grammes) may be taken as 30 grammes; the fluid ounce as 30 cubic centimetres; and the pound avoirdupois as half a kilogramme (approximately it is nine-twentieths).

In using the metric system, prescribers may consider the British grain as 60 milligrammes (nearer 0·065 Gm.), 1½ grains as 0·1 Gm., and 15 minims (nearer 17 minims) as approximately 1 cubic centimetre. (See table, pp. xxix and xxx.) *Note.*—The U.S.X also makes 15 minims equivalent to the Co.

The following approximations will also be useful :—

$$\text{80 minims} = \text{5 Cc.*} = \text{1 teaspoon.}$$

$$\text{240 minims} = \text{15 Cc.*} = \begin{cases}\text{3 teaspoons.}\\ \text{1 tablespoon.}\end{cases}$$

$$\text{960 minims} = \text{60 Cc.} = \begin{cases}\text{12 teaspoons.}\\ \text{4 tablespoons.}\\ \text{1 wineglass.}\end{cases}$$

$$\text{250 Cc.} = \text{50 teaspoons} = \begin{cases}\text{16 tablespoons (about).}\\ \text{4 wineglasses.}\\ \text{1 tumbler.}\end{cases}$$

The word gramme (preferably shortened to **Gram**), is contracted to **Gm.**, and the words cubic centimetre to **Cc.** The contraction **Gm.** in heavy type and with a capital initial letter distinguishes it from gr., the usual (though dangerous) contraction for grain. The latter is only used in our pages in the index for sake of brevity.

In the International Agreement respecting the Unification of Pharmacopœial Formulas for Potent Drugs signed at Brussels on Nov. 29, 1906, it was agreed that the normal **Drop Measure** officially recognised shall have external diameter of 3 mm., and give (at the temperature of 15° C.) 20 drops of distilled water per Gm.

For Analytical work this International drop is recognised in the *B.P.* '14. It is stated that at 15·5° C. 20 drops of water from the drop measure are equivalent to 1 millilitre.

The Farmacopea Oficial Española, 1905, and the French Codex give a very complete Drop Measure Table.

The sizes of bottles in most frequent use in France are :—

1,000, 500, 250, 200, 125, 100, 50, and 25 cubic centimetres.

Mixtures may be prescribed in 125, 200, or 250 Cc., or where it is desired to prolong the treatment 500 Cc. is a convenient size and drops should be ordered in quantities of 60, 30, and 15 Cc.

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* These quantities are respectively those recognised by the Fr. Cx. for a coffee spoonful (teaspoonful) and a tablespoonful (Cuillerée à Soupe).

According to the P. Belg.—

$$\left.\begin{array}{l}\text{La cuillerée à café holds 4 Gm. of water.}\\ \text{La cuillerée à dessert holds 10 Gm of water}\\ \text{La cuillerée à bouche ou à Soupe holds 15}\\ \quad\text{Gm. of water.}\end{array}\right\}\ \begin{array}{c}\text{as also in}\\ \text{Fr. Cx.}\end{array}$$

Generally speaking:—

One teaspoon = 4 Cc.
One dessertspoon = 8 Cc.
One tablespoon = 15 to 16 Cc.

METRIC WEIGHTS AND MEASURES AND THEIR EQUIVALENTS.

1 Gramme (or Gram) (Gm.) .. .. ..= 15·4323564 grains.
1 Centigramme (Cgm.) .. .. ..= 0·154323 grain.
1 Milligramme (Mgm.) .. .. ..= 0·015432 grain.
1 Litre .. ..= 35·196 fluid ounces.
1 Cubic Centimetre (Cc.).. .. ..= 16·9 minims (nearly).
1 Metre .. ..= 39·370113 inches.

The Gramme has its decimal multiples—Dekagramme, Hectogramme, and Kilogramme; and divisions—Decigramme, Centigramme, and Milligramme. The Litre and Metre have their corresponding decimal divisions—Decilitre, Centilitre, and Millilitre,—and Decimetre, Centimetre, and Millimetre.

In Continental States, where this system is now generally adopted for the dispensing and preparing of medicines, all liquids are weighed, and the terms Gramme, Centigramme, and Kilogramme only are used. This avoids the possibility of errors, which the similarity of the names Decagramme and Decigramme might lead to, but if the Greek prefix *deka* were always spelt with a *K* this possibility of error would not exist.

Furthermore, the quantities of the ingredients in prescriptions are sometimes written in decimal proportions, the gramme being understood to be the unit; the name of the integer is generally not mentioned, thus:

Rhubarb 35· means 35 grammes of Rhubarb
,, ·035 ,, 35 milligrammes

The following abbreviations are officially used in all French educational establishments:—

Myriamètre, mam
Kilomètre, km
Héctomètre, hm
Dékamètre, dam
Métre, m
Decimètre, dm
Centimètre, cm
Millimètre, mm
Dékastère, das
Stère, s or m^3

Dècistère, ds
tonne, t
Quintal métrique, q
Kilogramme, kg
Hectogramme, hg
Dékagramme, dag
Gramme, g
Décigramme, dg
Centigramme, cg
Milligramme, mg

Kilolitre, kl
Hectolitre, hl
Dékalitre, dal
Litre, l
Décilitre, dl
Centilitre, cl
Millilitre, ml
Hectare, ha
Are, a
Centiare, ca or m^2

PERCENTAGE AND GRAINS PER FLUID OUNCE EQUIVALENTS.

Where **Percentage Solutions** are mentioned, it is intended that 100 Cc. shall contain *n* Gm. or that 100 grain-measures of the finished solution shall contain *n* grains of the substance, *e.g.*, a 50 per cent. solution of Cocaine Hydrochloride will contain 50 Gm. in 100 Cc. or 50 grains in 100 grain-measures.

%		Grains per fluid ounce	%		Grains per fluid ounce	%		Grains per fluid ounce
10·0	..	43·75	4·5	..	19·7	1·4	..	6·1
9·5	..	41·56	4·0	..	17·5	1·3	..	5·7
9·0	..	39·4	3·5	..	15·3	1·2	..	5·25
8·5	..	37·2	3·0	..	13·1	1·1	..	4·8
8·0	..	35·0	2·5	..	10·95	1·0	..	4·4
7·5	..	32·8	2·0	..	8·75	0·9	..	3·95
7·0	..	30 6	1·9	..	8·3	0·8	..	3·5
6·5	..	28·45	1·8	..	7·9	0·7	..	3·05
6·0	..	26 25	1·7	..	7·45	0 6	..	2·6
5·5	..	24·05	1·6	..	7·0	0 5	..	2·2
5·0	..	21·9	1·5	..	6·55	0·4	..	1·75

APPROXIMATE EQUIVALENTS.

WEIGHTS. IMPERIAL TO METRIC.

grain.	Gm.	grain.	Gm.	grains.	Gm.
$\frac{1}{1000}$	= 0·000065	$\frac{1}{4}$	= 0·016	15	= 1·0
$\frac{1}{200}$	= 0·0003	$\frac{1}{3}$	= 0·02	20	= 1·2
$\frac{1}{100}$	= 0·0006	$\frac{1}{2}$	= 0·03	30	= 2·0
$\frac{1}{64}$	= 0·001	$\frac{3}{4}$	= 0·05	45	= 3·0
$\frac{1}{50}$	= 0·0013	1	= 0·06	60	= 4·0
$\frac{1}{40}$	= 0·0015	grains		90	= 6·0
$\frac{1}{32}$	= 0·002	1½	= 0·1	120	= 8·0
$\frac{1}{25}$	= 0·0025	2	= 0·12	150	=10·0
$\frac{1}{20}$	= 0·003	3	= 0·2	180	=12·0
$\frac{1}{16}$	= 0·004	4	= 0·25	½ ounce	
$\frac{1}{12}$	= 0·005	5	= 0·3	(av.)	=15·0
$\frac{1}{10}$	= 0·006	6	= 0·4	1 ,,	=30·0
$\frac{1}{8}$	= 0·008	8	= 0·5	(or nearer 28·35.	
$\frac{1}{6}$	= 0·01	10	= 0·6	1 pound	
$\frac{1}{5}$	= 0·012	12	= 0·8		=453·59

WEIGHTS. METRIC TO IMPERIAL.

1 kilogramme .. .. = 2 lb. 3¼ oz.
500 Gm. .. .. = 1 ,, 1⅝ ,,
100 ,, ... = 3½ oz.
25 ,, ... = ⅞ ,,
10 ,, ... = ⅓ ,,
1 ,, ... = 15·43 grains.
½ ,, or 500 milligrammes .. = 7·7 ,,

MEASURES. IMPERIAL TO METRIC.

minim.	Cc.	minims.	Cc.	fluid oz.	Cc.
½	= 0·03	15	= 1·0	1	= 30·0
1	= 0·06	20	= 1·2	fluid ozs.	
minims.		25	= 1·5	2	= 60·0
2	= 0·12	30	= 2·0	4	= 115·0
3	= 0·2	40	= 2·5	5	= 140·0
4	= 0·25	45	= 3·0	6	= 170·0
5	= 0·30	60	= 4·0	8	= 230·0
6	= 0·4	90	= 6·0	10	= 280·0
8	= 0·5	120	= 8·0	20	= 568·0
10	= 0·6	240	=15·0	gallon	litres.
12	= 0·8			1	= 4·536

MEASURES. METRIC TO IMPERIAL.

1 Cc. .. .. = 15 (nearer 17) minims.
1 litre .. .. = 1 pint 15 fl. oz. approx.

MEASURES OF LENGTH.

1 micromillimetre = $\frac{1}{1000000}$ millimetre, usually represented by $\mu\mu$.
1 micron = $\frac{1}{1000}$ millimetre, or 1 micrometre, ,, ,, μ.
1 millimetre = 0·03937 inch.
1 centimetre = 0·3937 inch.
1 decimetre = 3·937 inches.
1 metre = 39·370113 inches or 1 yard 3·37 inches nearly.

NEUTRALISATION TABLE.

		Citric Acid grains.	Tartaric Acid. grains.
Ammonium Carbonate	10 grains neutralise	13	14
Magnesium Carbonate		14	16
Potassium Bicarbonate		7	7¾
Sodium Bicarbonate		8½	9
Sodium Carbonate ($+10\ H_2O$)		5	5¼

Lemon Juice (freshly expressed from *Citrus Medica var. B. Limonum*) contains from 30 to 40 grains Citric Acid per ounce. A good lemon yields on average an ounce of juice.

Arithmetical Memoranda.

Ratio of circumference of a circle to its diameter $= \pi = 3{\cdot}14159$ Circumference of a circle $= 2\ \pi$ r. Area of a circle $= \pi\ r^2$.

Area of a Triangle with base a and height $h = \frac{1}{2}\ a\ h$.

Volume of a Cube with length $l = l^3$.

Volume of a Cylinder $= \pi\ r^2\ h$. If r and h be in inches, this divided be 277·278 the result is in gallons (water).

Volume of a Cone $= \dfrac{\pi\ r^2\ h}{3}$ Volume of a Sphere $= \dfrac{4}{3}\pi\ r^3$

A gallon of Water weighs 10 pounds; 1 gallon contains 277·278 cubic inches,

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A '**Corbyn**' = 40 ounces fluid (1 quart).
A '**Winchester**' quart = 80 ounces fluid (½ gallon).

Lead and Arsenic Calculations.

50 parts in 1,000,000 = 1 in 20,000 = 0·005%

$\frac{1}{100}$ grain per lb. = approx. 1·4 parts per million.

1% = 1 in 100
0·1% = 1 in 1,000
0·01% = 1 in 10,000
0·001% = 1 in 100,000
0·0001% = 1 in 1,000,000
0·0050% = 50 in 1,000,000

WATER ANALYSIS TRANSPOSITIONS.

To transpose grains per gallon into parts per million multiply by $\frac{100}{7}$

To transpose grains per gallon into parts per 100,000, multiply by $\frac{10}{7}$

To transpose parts per million into grains per gallon, multiply by $\frac{7}{100}$

To transpose parts per 100,000 into grains per gallon, multiply by $\frac{7}{10}$

RELATION OF VOLUME TO MASS (*B.P.*'14.).

1 minim = the volume at 16·7° C. of 0·9114583 grains of water.
1 fluid drachm = the volume at 16·7° C. of 54·6875 grains of water.
1 fluid ounce = the volume at 16·7° C. of 437·5 grains of water.
109·7143 minims (taken as 110 minims) = the volume at 16·7° C. of 100 grains of water.

CALCULATION OF A DOSE *FOR MAN* FROM KNOWN DOSE *FOR AN ANIMAL.*

The Rate of Catabolism of an animal is not proportional to size or weight but approximately to the body surface. Surfaces of solids of the same shape are proportional to the two-thirds power of their volumes (*i.e.*, the cube root of the square of the volumes). Since the specific gravity of animals varies only slightly, their body surface is a function of the two-thirds power of their weight. This relation is expressed by **Meeh's Formula**, $S = k(W)^{\frac{2}{3}}$, where S is the surface in square centimetres, W is the weight in grammes, and k is a factor which is nearly constant for all animals of the same shape. (See Armsby's "Nutrition of Animals"—Macmillan.)

(Rubner gives the following values for k: Man, 12·3; Dog, 10·3—11·2; Rabbit, 12·0—12·9; Cat, 9·9; Guinea Pig, 10·5.)

A formula for calculating the dose for man. This assumes that k, the factor, is the same for man and animals, and is approximate only, as the values actually differ somewhat.

If the dose for man and the animal should be proportional to their rates of catabolism, *i.e.*, to their body surface, then:

$$\frac{D_M}{D_A} = \frac{S_M}{S_A} = \frac{k(M)^{\frac{2}{3}}}{k(A)^{\frac{2}{3}}}$$

D_M = Dose for man in Gm.
D_A = Dose for adult test animal in Gm.
S_M = Body surface of man.
S_A = Body surface of animal.
M = Weight of man in Gm.
A = Weight of test animal in Gm.

$$\text{Hence } D_M = \frac{(M)^{\frac{2}{3}}}{(A)^{\frac{2}{3}}} \times D_A$$

$$= \frac{1590 \times D_A}{(A)^{\frac{2}{3}}} \text{ for a 10-stone (63·5 kilo) man.}$$

Thus, a dose of 1 Gm. per kilo for an animal *is equivalent to* 15·9 *Gm., not* 63·5 *Gm.*, for a 10-stone man.

No exact method of calculating the corresponding dose for man from that of an animal is known. The figure obtained by the above formula is useful as a guide, but allowance must still be made for the fact that man may be more sensitive to the drug than the animal.

TRANSPOSITION TABLE OF DOSES STATED FOR MAN IN MGR. PER KILO. TO MAN'S WEIGHT.

Mgr. per kilo.								
1	=	1	grain	(0·065 Gm.)	for a	10-stone	(63·5 kilo)	man
1·5	=	1½	,,	(0·10 Gm.)	,,	,,	,,	,,
2	=	2	,,	(0·13 Gm.)	,,	,,	,,	,,
2·5	=	2½	,,	(0·16 Gm.)	,,	,,	,,	,,
3	=	3	,,	(0·20 Gm.)	,,	,,	,,	,,
3·5	=	3½	,,	(0·23 Gm.)	,,	,,	,,	,,
4	=	4	,,	(0·26 Gm.)	,,	,,	,,	,,
4·5	=	4½	,,	(0·29 Gm.)	,,	,,	,,	,,
5	=	5	,,	(0·32 Gm.)	,,	,,	,,	,,
5·5	=	5½	,,	(0·36 Gm.)	,,	,,	,,	,,
6	=	6	,,	(0·39 Gm.)	,,	,,	,,	,,
6·5	=	6½	,,	(0·42 Gm.)	,,	,,	,,	,,
7	=	7	,,	(0·45 Gm.)	,,	,,	,,	,,
7·5	=	7½	,,	(0·48 Gm.)	,,	,,	,,	,,
8	=	8	,,	(0·52 Gm.)	,,	,,	,,	,,
8·5	=	8½	,,	(0·55 Gm.)	,,	,,	,,	,,
9	=	9	,,	(0·58 Gm.)	,,	,,	,,	,,
9·5	=	9½	,,	(0·61 Gm.)	,,	,,	,,	,,
10	=	10	,,	(0·64 Gm.)	,,	,,	,,	,,
15	=	15	,,	(0·96 Gm.)	,,	,,	,,	,,
20	=	20	,,	(1·27 Gm.)	,,	,,	,,	,,
30	=	30	,,	(1·91 Gm.)	,,	,,	,,	,,
40	=	40	,,	(2·55 Gm.)	,,	,,	,,	,,
50	=	50	,,	(3·20 Gm.)	,,	,,	,,	,,
60	=	60	,,	(3·90 Gm.)	,,	,,	,,	,,
70	=	70	,,	(4·55 Gm.)	,,	,,	,,	,,
80	=	80	,,	(5·20 Gm.)	,,	,,	,,	,,
90	=	90	,,	(5·85 Gm.)	,,	,,	,,	,,
100	=	100	,,	(6·50 Gm.)	,,	,,	,,	,,

As 5 mgr. per kilo more nearly = 4·9 grains (0·318 Gm.) per 10-stone man, the above figures contain a 2% *error in excess.*

THERMOMETRIC EQUIVALENTS.

For temperatures below the freezing point of water:—

°C.	°F.	°C.	°F.	°C.	°F.	°C.	°F.	°C.	°F.
—	—	—	—	—	—	—	+	—	+
40	40·0	31	23·8	22	7.6	16	3.2	7	19·4
39	38·2	30	22·0	21	5·8	15	5·0	6	21·2
38	36·4	29	20·2	20	4·0	14	6·8	5	23·0
37	34·6	28	18·4	19	2·2	13	8·6	4	24·8
36	32·8	27	16·6	18	0·4	12	10·4	3	26·6
35	31·0	26	14·8	17·778	0·0	11	12·2	2	28·4
34	29·2	25	13·0			10	14·0	1	30·2
33	27·4	24	11·2	—	+	9	15·8	0	32·0
32	25·6	23	9·4	17	1·4	8	17·6		

For temperatures above the freezing point of water:—

°C.	°F.	°C.	°F.	°C.	°F.	°C.	°F.	°C.	°F.
+	+	+	+	+	+	+	+	+	+
1	33·8	39	102·2	77	170·6	115	239·0	153	307·4
2	35·6	40	104·0	78	172·4	116	240·8	154	309·2
3	37·4	41	105·8	79	174·2	117	242·6	155	311·0
4	39·2	42	107·6	80	176·0	118	244·4	156	312·8
5	41·0	43	109·4	81	177·8	119	246·2	157	314·6
6	42·8	44	111·2	82	179·6	120	248·0	158	316·4
7	44·6	45	113·0	83	181·4	121	249·8	159	318·2
8	46·4	46	114·8	84	183·2	122	251·6	160	320·0
9	48·2	47	116·6	85	185·0	123	253·4	161	321·8
10	50·0	48	118·4	86	186·8	124	255·2	162	323·6
11	51·8	49	120·2	87	188·6	125	257·0	163	325·4
12	53·6	50	122·0	88	190·4	126	258·8	164	327·2
13	55·4	51	123·8	89	192·2	127	260·6	165	329·0
14	57·2	52	125·6	90	194·0	128	262·4	166	330·8
15	59·0	53	127·4	91	195·8	129	264·2	167	332·6
16	60·8	54	129·2	92	197·6	130	266·0	168	334·4
17	62·6	55	131·0	93	199·4	131	267·8	169	336·2
18	64·4	56	132·8	94	201·2	132	269·6	170	338·0
19	66·2	57	134·6	95	203·0	133	271·4	171	339·8
20	68·0	58	136·4	96	204·8	134	273·2	172	341·6
21	69·8	59	138·2	97	206·6	135	275·0	173	343·4
22	71·6	60	140·0	98	208·4	136	276·8	174	345·2
23	73·4	61	141·8	99	210·2	137	278·6	175	347·0
24	75·2	62	143·6	100	212·0	138	280·4	176	348·8
25	77·0	63	145·4	101	213·8	139	282·2	177	350·6
26	78·8	64	147·2	102	215·6	140	284·0	178	352·4
27	80·6	65	149·0	103	217·4	141	285·8	179	354·2
28	82·4	66	150·8	104	219·2	142	287·6	180	356·0
29	84·2	67	152·6	105	221·0	143	289·4	181	357·8
30	86·0	68	154·4	106	222·8	144	291·2	182	359·6
31	87·8	69	156·2	107	224·6	145	293·0	183	361·4
32	89·6	70	158·0	108	226·4	146	294·8	184	363·2
33	91·4	71	159·8	109	228·2	147	296·6	185	365·0
34	93·2	72	161·6	110	230·0	148	298·4	186	366·8
35	95·0	73	163·4	111	231·8	149	300·2	187	368·6
36	96·8	74	165·2	112	233·6	150	302·0	188	370·4
37	98·6	75	167·0	113	235·4	151	303·8	189	372·2
38	100·4	76	168·8	114	237·2	152	305·6	190	374·0

Thermometric Equivalents—*continued.*

°C.	°F.	°C.	°F.	°C.	°F.	°C.	°F.	°C.	°F.
+	+	+	+	+	+	+	+	+	+
191	375·8	213	415·4	235	455·0	257	494·6	279	534·2
192	377·6	214	417·2	236	456·8	258	496·4	280	536·0
193	379·4	215	419·0	237	458·6	259	498·2	281	537·8
194	381·2	216	420·8	238	460·4	260	500·0	282	539·6
195	383·0	217	422·6	239	462·2	261	501·8	283	541·4
196	384·8	218	424·4	240	464·0	262	503·6	284	543·2
197	386·6	219	426·2	241	645·8	263	505·4	285	545·0
198	388·4	220	428·0	242	467·6	264	507·2	286	546·8
199	390·2	221	429·8	243	469·4	265	509·0	287	548·6
200	392·0	222	431·6	244	471·2	266	510·8	288	550·4
201	393·8	223	433·4	245	473·0	267	512·6	289	552·2
202	395·6	224	435·2	246	474·8	268	514·4	290	554·0
203	397·4	225	437·0	247	476·6	269	516·2	291	555·8
204	399·2	226	438·8	248	478·4	270	518·0	292	557·6
205	401·0	227	440·6	249	480·2	271	519·8	293	559·4
206	402·8	228	442·4	250	482·0	272	521·6	294	561·2
207	404·6	229	444·2	251	483·8	273	523·4	295	563·0
208	406·4	230	446·0	252	485·6	274	525·2	296	564·8
209	408·2	231	447·8	253	487·4	275	527·0	297	566·6
210	410·0	232	449·6	254	489·2	276	528·8	298	568·4
211	411·8	233	451·4	255	491·0	277	530·6	299	570·2
212	413·6	234	453·2	256	492·8	278	532·4	300	572·0

EQUIVALENTS WITHIN CLINICAL LIMITS.

°C.	°F.	°C.	°F.	°C.	°F.	°C.	°F.	°C.	°F.
35·0	95·0	36·9	98·42	38·8	101·84	40·7	105·26	42·6	108·68
35·1	95·18	37·0	98·60	38·9	102·02	40·8	105·44	42·7	108·86
35·2	95·36	37·1	98·78	39·0	102·20	40·9	105·62	42·8	109·04
35·3	95·54	37·2	98·96	39·1	102·38	41·0	105·80	42·9	109·22
35·4	95·72	37·3	99·14	39·2	102·56	41·1	105·98	43·0	109·40
35·5	95·90	37·4	99·32	39·3	102·74	41·2	106·16	43·1	109·58
35·6	96·08	37·5	99·50	39·4	102·92	41·3	106·34	43·2	109·76
35·7	96·26	37·6	99·68	39·5	103·10	41·4	106·52	43·3	109·94
35·8	96·44	37·7	99·86	39·6	103·28	41·5	106·70	43·4	110·12
35·9	96·62	37·8	100·04	39·7	103·46	41·6	106·88	43·5	110·30
36·0	96·80	37·9	100·22	39·8	103·64	41·7	107·06	43·6	110·48
36·1	96·98	38·0	100·40	39·9	103·82	41·8	107·24	43·7	110·66
36·2	97·16	38·1	100·58	40·0	104·0	41·9	107·42	43·8	110·84
36·3	97·34	38·2	100·76	40·1	104·18	42·0	107·60	43·9	111·02
36·4	97·52	38·3	100·94	40·2	104·36	42·1	107·78	44·0	111·20
36·5	97·70	38·4	101·12	40·3	104·54	42·2	107·96		
36·6	97·88	38·5	101·30	40·4	104·72	42·3	108·14		
36·7	98·06	38·6	101·48	40·5	104·90	42·4	108·32		
36·8	98·24	38·7	101·66	40·6	105·08	42·5	108·50		

The Reaumur scale (with zero at freezing point of water and the boiling point of water being 80°) is now little used.

To convert a temperature in Centigrade into Fahrenheit multiply by $\frac{9}{5}$ and add 32.

Conversely, to transpose Fahrenheit into Centigrade subtract 32 and multiply by $\frac{5}{9}$.

To convert Centigrade into Reaumur multiply by $\frac{4}{5}$.

To convert Reaumur into Centigrade multiply by $\frac{5}{4}$.

To convert Fahrenheit into Reaumur subtract 32 and multiply by $\frac{4}{9}$.

To convert Reaumur into Fahrenheit multiply by $\frac{9}{4}$ and add 32.

INTERNATIONAL (1925) ATOMIC WEIGHTS AND ATOMIC NUMBERS.

The Molecular Weights of Compounds in our work are now given through-out in terms of the following Atomic Wts.

	Symbol.	At. Number.	At. Weight.		Symbol.	At. Number.	At. Weight.
Silver	Ag	47	107·880	Nitrogen	N	7	14·008
Aluminium	Al	13	26·97	Sodium	Na	11	22·997
Argon	A (Ar)	18	39·91	Columbium	Cb	41	93·1
Arsenic	As	33	74·96	Niobium	Nb		
Gold	Au	79	197·2	Neodymium	Nd	60	144·27
Boron	B	5	10·82	Neon	Ne	10	20·2
Barium	Ba	56	137·37	Nickel	Ni	28	58·69
Beryllium	Be	4	9·02	Oxygen	O	8	16·000
Glucinium	Gl			Osmium	Os	76	190·8
Bismuth	Bi	83	209·00	Phosphorus	P	15	31·027
Bromine	Br	35	79·916	Lead	Pb	82	207·20
Carbon	C	6	12·000	Palladium	Pd	46	106·7
Calcium	Ca	20	40·07	Praseodymium	Pr	59	140·92
Cadmium	Cd	48	112·41				
Cerium	Ce	58	140·25	Platinum	Pt	78	195·23
Chlorine	Cl	17	35·457	Radium	Ra	88	225·95
Cobalt	Co	27	58·94	Rubidium	Rb	37	85·44
Chromium	Cr	24	52·01	Rhodium	Rh	45	102·91
Caesium	Cs	55	132·81	Radon	Rn	86	222·
Copper	Cu	29	63·57	Ruthenium	Ru	44	101·7
Dysprosium	Dy	66	162·52	Sulphur	S	16	32·064
Erbium	Er	68	167·7	Antimony	Sb	51	121·77
Europium	Eu	63	152·0	Scandium	Sc	21	45·10
Fluorine	F	9	19·00	Selenium	Se	34	79·2
Iron	Fe	26	55·84	Silicon	Si	14	28·06
Gallium	Ga	31	69·72	Samarium	Sm	62	150·43
Gadolinium	Gd	64	157·26	Tin	Sn	50	118·70
Germanium	Ge	32	72·60	Strontium	Sr	38	87·63
Hydrogen	H	1	1·008	Tantalum	Ta	73	181·5
Helium	He	2	4·00	Terbium	Tb	65	159·2
Mercury	Hg	80	200·61	Tellurium	Te	52	127·5
Holmium	Ho	67	163·4	Thorium	Th	90	232·15
Iodine	I (J)	53	126·932	Titanium	Ti	22	48·1
Indium	In	49	114·8	Thallium	Tl	81	204·39
Iridium	Ir	77	193·1	Thulium	Tm	69	169·4
Potassium	K	19	39·096	Uranium	U	92	238·17
Krypton	Kr	36	82·9	Vanadium	V	23	50·96
Lanthanum	La	57	138·90	Tungsten	W	74	184·0
Lithium	Li	3	6·940	Wolfram			
Lutecium	Lu	71	175·0	Xenon	Xe	54	130·2
Magnesium	Mg	12	24·32	Yttrium	Y	39	88·9
Manganese	Mn	25	54·93	Ytterbium	Yb	70	173·6
Molybdenum	Mo	42	96·0	Zinc	Zn	30	65·38
				Zirconium	Zr	40	91

Isotopes.—Contrary to the Atomic Theory of Dalton that atoms of the same element are similar to one another and equal in weight, the view now is that there must exist elements having chemical properties identical for all practical purposes but the atoms of which have different weights.

For a consideration of this subject including the International Table of Isotopes, see Vol. II.

ACACIÆ GUMMI (*B.P.* '14).

Syn. ACACIA U.S. X., GOMME ARABIQUE, GOMME DU SÉNÉGAL, R. CX.

A gummy exudate from A. Senegal, *Willdenow* (*N.O. Leguminosæ*), nd other species, either colourless or with yellowish tint.

The gum consists, in the main, of a mixture of Alkali Arabinates.

Soluble almost completely in water; insoluble in Alcohol.

As ***emulsifying agent*** for oils, Powdered Gum Acacia is used, *e.g.*, in istura Olei Ricini (*B.P.* '14), the usual proportion being about 1 of Gum to of oil. Less suffices in some cases. For suspending resinous ingredients f Tinctures *vide* Tincturæ. For its use as a pill excipient *vide* Pilulæ.

Mucilago Acaciæ (*B.P.* '14).—Gum Acacia 4, washed to reove any adherent dust, dissolved in water 6. This quantity easures about 8¾. Benzoic Acid 0·1% added will keep it.

Incompatibles.—Alcohol, Mineral Acids, Borax, Ferric Salts, xalic Acid and most Lead Salts. Bismuth Carbonate should not e suspended with Acacia Mucilage. Tragacanth answers better.

Mucilago, U.S. Contains Gum Acacia 35, Sodium Benzoate 0·1, Water to 100.

Potion Gommeuse. FR. CX. Gum Acacia Powder 1, Syrup 3, Orange lower Water 1, Water 10, parts by weight.

um Acacia Solution for Intravenous Injection. *Syn.* SOLUTIO ALINA CUM ACACIA, U.C.H. AND ST. TH. H. (6% Gum); INJECTIO ALINÆ ET GUMMI ACACIÆ, R.N.H. (7% GUM).

Gum Acacia 70 Gm., Sodium Chloride 9 Gm., Water to 1 litre. he solution to be sterilised after straining through fine linen. The ddition of any antiseptic is not desirable.

um Acacia "Sterules" are prepared.

The contents of one Sterule, diluted to 250 Cc. with boiled water, roduces a 7% injection in Normal Saline.

Uses.—To raise blood pressure after loss of blood, *e.g.*, from a ound of the femoral artery. Many such cases could be saved if he blood pressure could be kept up for 24 hours or so. The solution as the same viscosity as the blood and a content of colloids with smotic pressure equal to that of the blood. Hence after its injecion there is little tendency for water to pass into the tissues. Large uantities may be used.

In surgical shock the method has been found of great value.

In certain conditions the permeability of the blood vessels is increased in uch a way that blood plasma itself escapes without the corpuscles. In thers, water alone escapes, leaving proteins in addition to the corpuscles. n the former the blood requires diluting with a solution having the viscosity f blood plasma, not that of the whole blood. The blood vessels are impermeable to colloids, so that their osmotic pressure is effective in retaining ithin the circulation the solution injected. Even 2% of Gum has properties uperior to the salts alone. Solutions of 5% or over will restore permanently he low arterial pressure due to loss of blood.—Sir W. M. Bayliss, B.M.J. ./17,564; ii./17,808; i./19,262. Jl. Ph. & Exp. Ther., Mar. 1920, p. 29.

Shock from wounds well treated by the method (6% solution).—Sir W. M. ayliss, B.M.J. i./18, 553.

Gelatin 2% has also been suggested.—Med. Res. Counc. B.M.J. i./17,383.

The balance of Colloid and Crystalloid in cholera, shock and allied conditions. —B. Moore. B.M.J. ii./19,490.

The use of saline solutions intravenously. The increase in blood volume aused, enables the heart to send on a large volume. When the total volume f blood is deficient the tissues suffer from want of Oxygen though the blood may be of normal constitution. Normal Saline was first proposed, but it disappears from the circulation in 20 to 30 minutes. A colloid with an osmotic pressure equal to that of the blood colloids must be added. Good gum answers the purpose well.—Sir W. M. Bayliss, L. i./23,575.

Gum infusion versus blood transfusion.—Evidence asked for efficacy of this substitute for the physiological remedy.—L. i./22,754. (*Cf.* Blood Transfusion.)

Deleterious effects of Gum Acacia in transfusion. Stated not to improve chance of recovery of animals which have been subjected to "Standard hæmorrhage."—Jl.Am.Ph.A. '22/387. Possibly there may be injurious effect on the kidneys.

Acacia Gum Glucose Injections.—Intravenously, influences urine excretion and blood volume in rabbits. Gum Acacia is capable of maintaining the blood volume in spite of marked Glucose diuresis. Glucose injections without Gum Acacia produce a diminution of the blood volume.—P. M. Mattill, Katherine Mayer and L. W. Sauer, Jl. Ph. & Exp. Ther., Dec. 1920.

Surgical shock treated by intravenous infusion of 1 to 1½ pints Normal Saline containing 3% Gum Acacia and 1% Glucose. Surgery at advanced operating centre.—C. F. M. Saint, B.M.J. i./18,473.

Ghatti Gum is from *Anogeissus latifolia* (*N.O. Combretaceæ*)—used technically chiefly.

Mucilago of this is *B.P.* '14. 1 to 3 of water.

ACETANILIDUM (*B.P.* '14).

And most Pharmacopœias.

Syn. ANTIFEBRIN, PHENYLACETAMIDE.

$CH_3CO.\ NH.C_6H_5=135{\cdot}08.$

Dose.—2 to 5 grains (0·12 to 0·3 Gm.) Maximum single dose 8 grains (0·5 Gm.); Max. daily dose 23 grains (1·5 Gm.). May be given in cachets or suspended by compound tragacanth powder.

Prepared by the action of glacial acetic acid on aniline. In small white odourless glittering crystals with M. Pt. 113°C., which produce a burning sensation on the tongue.

Antidotes.—Emetics, Inhalation of Ether and Oxygen, Stimulants—*e.g.*, Strychnine hypodermically, warmth to feet and body.

Soluble 1 in 210 of water, slightly in glycerin, 1 in 4·2 of alcohol 90%, 1 in 20 of brandy with difficulty; easily in chloroform, benzol and ether.

Pharmacology.—The anilides, *e.g.*, Acetanilide and Phenacetin, owe their activity in part to the fact that they are only slowly hydrolysed in the organism with liberation of the parent base.—O C. M. Davis, B.M.J. ii./22,11.

The action on the heart, blood and respiration is similar to that of Aniline. In acute Aniline poisoning, there is a relative increase in erythrocytes, hæmoglobin and oxygen capacity; with a very low blood pressure. Chronic poisoning causes anæmia. The brown colour of the blood and urine is due to the presence of *p*-amino-phenol.—J. Ph. Exp. & Ther., '26,125, per B.C.A., '26, A.756.

Uses.—As a febrifuge and antipyretic, hypnotic sedative, anti-epileptic, anti-arthritic, and nervine tonic. Checks the chills and fever of phthisis, quiets the nervous system, and is useful in typhoid. Relieves sciatica and the darting pains of locomotor ataxy.

WOUNDS (amputations, also injuries to limbs by accidents) have been treated by acetanilide as a dusting powder. 25 years' experience of its antiseptic use. Employ Hydrogen Peroxide first. Could be used in war without fear of suppuration. Syphilitic sores have been similarly dressed.—E. F. Greene, B.M.J. i./15,928.

Tablets, 3 grains (0·2 Gm.). *Dose.*—1 or 2.

Also made **with Caffeine,** 1 grain ; useful in migraine.

Slipule No. 1 holds 5 grains (**0·3 Gm.**).

Effervescent Acetanilide. *Dose.*—1 drachm.

In two strengths, 1 and 3 grains in 1 drachm.

Pulvis Acetanilidi Compositus, U.S. VIII. (*not now in U.S.*).

Dose.—3 to 5 grains (**0·2 to 0·3 Gm.**).

Acetanilide 7, Caffeine 1, Sodium Bicarbonate 2.

Elixir Acetanilidi Compositum.

Dose.—½ to 1 drachm (**2 to 4 Cc.**).

Acetanilide 326 grains, Caffeine 32 grains, Nux Vomica Tincture 56 minims, Aromatic Spirit of Ammonia 8 ounces, Aromatic Elixir o 16 ounces. Filter with aid of Talc 120 grains. For headache.

For deaths from and risks with Acetanilide; Tests for Acetanilide, also use of cetanilide in the form of 'TUBES TEMOINS' *to determine efficient sterilisation f Dressings, see Vol. II.*

✱Phenalgin (T.M. 221616). *Dose.*—5 to 20 grains (**0·3 to ·2 Gm.**).

A mixture with Antifebrin as the active base, as an antipyretic nd hypnotic. **Tablets and Gelatin (Hard) Capsules,** 5 grains.

aution.—

A rough analysis of Phenalgin was found to give Acetanilide 60%, Sodium icarbonate 25%, Ammonium Carbonate 15%. Incompatible with Calomel nd Aspirin. Dangerous interaction may occur.—J. Noble, *P.J.*i./22,151.

Methylacetanilide. *Syn.* ✱EXALGINE. (T.M. 90208). FR. Cx. $_6H_5N\ (CH_3)\ CH_3CO = 149{\cdot}096$.

Dose.—½ to 2 grains (**0·03 to 0·12 Gm.**) in pill. In colourless rystals, with a slight saline taste.

Soluble 1 in 60 of water, freely so in alcohol.

Mistura Exalgine. *Dose.*—2 to 4 drachms (**8 to 15 Cc.**) Exalgine 1, Tincture of Orange 4, Syrup of Orange-Flower 12, Water to 100.

Tabellæ Exalgine—½ grain (**0·03 Gm.**) each, with chocolate.

An analgesic, anti-neuralgic, antipyretic (only in unsafe doses). oxic doses cause paralysis of respiratory organs.

Incompatible with salicylic acid.

ACIDUM ACETICUM.

Acidum Aceticum Glaciale (*B.P.* '14). U.S. X. Contains 98·9% ydrogen Acetate. $CH_3.COOH = 60{\cdot}03$. Sp. Gr. 1·058.

A colourless liquid or crystals melting at about 14·7° C.

Uses.—Is not given internally. It is applied to corns and warts. as caustic action, but gives much pain.

Psoriasis of a chronic type has been cured in a week or two by Glacial cetic Acid locally.

Antidotes.—Chalk and water, alkalis, magnesia, washing soda, nd then demulcents such as olive or almond oil, milk, or white of egg.

cidum Aceticum (*B.P.* '14). 33%. U.S. X. is 36–37%.

Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

This has Sp. Gr. 1·044. P. AUSTR. and P.G.VI. designate this cid 'Dilutum.' A product of the destructive distillation of wood nd of the oxidation of ethylic alcohol.

Incompatibles.—Alkalis. (Hydrates, Carbonates, etc.)

Use.—Externally for ringworm.

Acidum Aceticum Dilutum (*B.P.* '14). 5%.

Dose.—½ to 1 drachm (2 to 4 Cc.).

Sp. Gr. 1·007. (Fr. Cx. is 10%; U.S. X. 5·7–6·3%.)

Uses.—May be given as an antidote to poisoning by alkalis, and largely diluted is applied as a lotion for inflamed joints, &c., and to bathe the skin as a refrigerant in cases of fever. Has been taken to reduce obesity, but is not to be recommended.

Cancer of the cervix uteri has been treated by douching twice daily with weak solution of Acetic Acid. A patient kept fairly well for many years.

Lotio Acidi Acetici R.O.H. Diluted Acetic Acid 6, Water to 100. Has been used to relieve itching and irritation, *e.g.*, in spring catarrh.

Acetum. *Syn.* Vinegar. Contains about 4% of acetic acid. Made from fermented Malt Liquor and from wine and artificially by diluting Acetic Acid and colouring with burnt sugar.

Chronic vinegar poisoning in which nearly a quart of vinegar had been taken every day for 30 years.—D. A. Urquhart, B.M.J., ii./27,1226.

Acidum Pyrolignosum Crudum. A brown acid liquid, the product of destructive distillation of wood. Contains Acetic Acid 5 to 13% (P.G. VI. has minimum 8·4%) according to the kind of wood used, also other acids—Propionic, Butyric, etc., also small quantities of Methyl Alcohol, Furfural, Pyridine, Creosote and Resins. Has been employed locally to gangrene and has veterinary uses. It has antiseptic and preservative properties, *e.g.*, fresh meat dipped in it will keep for months.

Acidum Pyrolignosum Rectificatum.

Contains about 5% Acetic Acid. A yellowish liquid becoming darker on keeping, prepared from the above by fractional distillation, employing the first 80% passing over. Is occasionally ordered diluted 5 to 10% in mouthwashes and gargles.

Acetic Anhydride. $(CH_3CO)_2O = 102{\cdot}048$.

A colourless liquid with powerful acetic odour. Sp. Gr. 1·080. B. Pt. 138° C. Made by distilling acetyl chloride with an alkaline acetate. Tests 95 to 98% pure, the rest being acetic acid. Not employed medicinally to any extent, but chemically, *e.g.*, in the process of acetylation. Should be free from Hydrochloric Acid.

A Further Method of Manufacture.—British Patent 137701. By interaction of Anhydrous Sodium Acetate and Carbonyl Chloride, thus $2CH_3.COONa + COCl_2 = (CH_3.CO)_2O + CO_2 + NaCl$.—J.C.S.A. i./20.287.

Acetyl Chloride. $CH_3COCl = 78{\cdot}481$.

Manufacture.—By combining carefully Glacial Acetic Acid 130, with Phosphorus Pentachloride 137. Finally, distil and redistil the fraction passing over below 60° C.—this separates from phosphorus oxychloride. A volatile liquid with intensely penetrating odour, boiling at 51° C.

Acidum Amido-Aceticum.—*Syn.* Glycocoll, Glycine.

$CH_2.NH_2.COOH = 75{\cdot}048$.

Dose.—10 to 30 grains (0·6 to 2 Gm.) suggested.

White crystals with sweet taste, ***soluble*** in water 1 in 4½, slightly in alcohol, not in ether. M. Pt. 234° C. It is both acidic, by reason of its acid group, and basic by reason of its amino grouping. It forms double salts with soluble metallic chlorides and nitrates.

Manufactured by heating monochloracetic acid 1, with ammonium carbonate 3, to about 65° C., and finally to 130° C. Dissolve the residue in water, boil with lead oxide to remove ammonia, filter and remove the lead from the filtrate with Sulphuretted Hydrogen and evaporate to crystallise.

The Amino-Acids are diuretic—they are decomposed by the liver with formation of urea. Gycocoll used as such is non-toxic and is not unpleasant to take. Experiments on healthy individuals showed decided increase in the output of urine under daily doses of 5 Gm.; Sp Gr. remaining the same, also increase in Chlorides excreted. In some cases good results by the use of Glycocoll with Digitalis.—P.J. ii./11,499.

The name "Glycin," (not now a T.M.), though applied in Chemistry to this body, was given (P.J. i./07,208) to *p*-oxy-phenyl-amido-acetic Acid $C_6H_4OH.NHCH_2.COOH.=167{\cdot}08$. Used in photography as a developer.

For further consideration of AMINO-ACIDS *see Vol. II.*

Hydrargyri Amido-acetas. *Syn.* **Hydrargyrum Glycocoll,** $(C_2H_4NO_2)_2Hg=348{\cdot}69$. *Dose.*—1/6 grain (**0·01 Gm.**) hypodermically. Manufactured by dissolving freshly **made** mercuric oxide in the acid. Used in syphilis.

Choline $HO.N(CH_3)_3C_2H_4.OH=121{\cdot}128$ is a non-poisonous syrupy fluid (*v.* also Vol. II). A decomposition product of Lecithin.

Choline Borate $C_5H_{15}NO_2.H_3BO_3=182{\cdot}972$.

A 10% Aqueous Solution under the name **Enzytol, was given intravenously** and intramuscularly in cancer.

The Choline was to be the synthetic variety, free **from Neurine or might** prove toxic.

Choline Borate, Salicylate, Iodo-benzoate, etc. solutions, **relatively non-poisonous**—subject of patent 8031/1914, see **J.C.S.A. i./20,18.**

Choline has been isolated from washed portions of **rabbits', dogs' and cats'** intestine. It has the power of stimulating intestinal movements. **Acetylcholine** is even more active in stimulating peristalsis.—**Le Heux, Pfluger's** Archiv. 1919, p. 8, per Pres., Oct.,'20,361.

Choline Chloride. *Syn.* CHOLINE HYDROCHLORIDE.

$Cl.N(CH_3)_3C_2H_4.OH=139{\cdot}577$. *Dose.*—0·6 Gm. intravenously.

Deliquescent needles soluble in water and Alcohol.

ILEUS treated by Choline Hydrochloride. It acts on the hormone of intestinal movement. That it is specific in its action on the intestine is shown by the fact that it does not affect the rhythmicity of the heart or of the uterus. In practice it is well to make ampoules containing 0·6 Gm. of the Hydrochloride in 6 Cc. This solution is diluted with 180 Cc. of Normal Saline and given intravenously. At least 17 minutes should be employed to administer the whole of the solution. The treatment re-established normal function in some cases.—C. G. L. Wolf and J. R. C. Canney, L. i./26,707.

Neurine is chemically Trimethyl-Vinyl-Ammonium Hydroxide. $N.(CH_3)_3(C_2H_3)OH=103{\cdot}112$.

A ptomaine resulting as a decomposition product of meat. Highly poisonous. Hygroscopic. Commercially a 25% solution is prepared. Gehe mentions 3 to 6% aqueous solution for painting diphtheritic membrane.

Betaina. *Syn.* TRIMETHYL-GLYCOCOLL. $C_5H_{11}NO_2=117{\cdot}081$.

Betaine occurs in *beets and mangolds* (especially *un*ripe roots) and has been found in a number of vegetable and animal substances.

It is formed on oxidation of Choline and is chemically related to Muscarine and Neurine.

Betainæ Hydrochloridum.—*Syn.* ✻ ACIDOL. (T.M. 263431.)
$C_5H_{11}NO_2.HCl=153{\cdot}561$.
Dose.—1 to 8 grains (**0·06 to 0·5 Gm.**)

Manufacture.—Patented method from Molasses, etc. —

The usual method of manufacture is based on the formation of the Hydrochloride by passing gaseous Hydrochloric Acid **into** the Molasses—left over after separation of the crystallisable bodies. The method in this patent

No. 11,354 of 1912, is stated to be based on accurate knowledge of the conditions under which Betaine Hydrochloride and the other Chlorides formed are soluble.—P.J ii '12,552. See also C.D. i./10,423.

White crystalline substance soluble in water 1 in 2; in alcohol about 1 in 20.

Uses.—Liberates hydrochloric acid (almost 25% of its weight), and is given with pepsin or diluted with water in gastric affections.

Flavoring.—Glyl Rosæ, Glyl Menthæ Piperitæ, Syl Caryophylli; Syrupus Aurantii.

Acetamide. $CH_3.CO.NH_2 = 59{\cdot}048$.

Deliquescent crystals M.Pt. 82°C., made by interaction of **Ammonia** and Acetyl Chloride.

As a denaturant (½%) of Alcohol has been used *e.g.* in Phenacetin manufacture.

Acetamide or Formamide, either molten or in solution, used in extracting drugs.—F. Bayer & Co.'s Patent.—P.J.ii./22,295.

ACIDUM BENZOICUM (*B.P.* '14).

Syn. Benzoyl Hydrate. $C_6H_5.COOH = 122{\cdot}048$

Dose.—5 to 15 grains (**0·3 to 1 Gm.**).

Manufactured either from Gum Benzoin or from Toluol, the former being the more expensive.

Soluble, if pure, 1 in 400 of water; 1 in 3 of alcohol 90%; 1 in 7 of chloroform: and very soluble in fats, oils, alkaline solutions (forming benzoates), and in glycerin about 1 in 30.

Incompatible with Ferric Salts and Mercuric Chloride.

Uses.—Benzoic acid is an antiseptic, a stimulating expectorant, antipyretic and diuretic. It is given in cases of chronic cystitis, urinary calculi and incontinence, also for rheumatism, further in large doses in phthisis, diphtheria, tonsillitis and scarlet fever. It prevents fats becoming rancid, as in Adeps Benzoatus, *q.v.*

Four grains of Benzoic Acid with 1 grain of Canada Balsam, or 1 minim of glycerin, make a good pill.

A one in 20 solution in alcohol relieves urticaria, and, as an **Antiseptic Lotion** or **Gargle**, 1 dissolved in 500 of water is employed, or it may be suspended with glycerin if more than will dissolve.

15 to 20 grains every hour or 2 hours has specific remedial action in acute rheumatism, but is much weaker than Sodium Salicylate. —R. Stockman, B.M.J. i./13,597.

For use as preservative in Foods, etc., see Vol. II.

Tablets, Compound, *v. Index.*

Benzoin.—There are two varieties known as Siam and Sumatra, the former being the better. U.S. X. allows both. Sumatra Benzoin is *B.P.*,'14 if at least 85% soluble in alcohol 90%. *For source of Siam Benzoin, see Vol. II.*

Tinctura Benzoini Composita (*P.B.* '14). *Syn.* Friars' Balsam, Traumatic Balsam.

Dose.—½ to 1 drachm (**2 to 4 Cc.**), with yolk of egg. U.S.X. has approximately same composition as *B.P.* '14.

A drachm to a pint of hot water is valuable as an inhalation in acute laryngitis. Undiluted it is used as a wound dressing.

Tinctura Benzoini Simplex.

Dose.—½ to 1 drachm (**2 to 4 Cc.**).

One in 10 of Alcohol (90%) (U.S.X. is 1 in 5). One in Rose Water 40, useful as a face lotion in urticaria and in irritable conditions of the skin.

Mistura Balsami Composita.—Vic. Park. *Dose.*—1 ounce (**30 Cc.**).

Compound Tincture of Benzoin, Tincture of Tolu and Compound Tincture of Camphor, of each 20 minims, Ammoniacum Mixture to 1 ounce.

Sphygmographic Varnish. Contains Benzoin, Balsam of Tolu and Alcohol. This is used for pulse tracings.

Collutorium Acidi Benzoici, R.D.H.

Dose.—One tablespoonful in a tumblerful of water.

Benzoic Acid 10 grains, Krameria Tincture 15 minims, Gluside 6 grains, Peppermint Oil 2 minims, Cinnamon Oil 2 minims, Alcohol 90% to 1 ounce.

Miller's Mouth Wash is similar.

Trochisci Acidi Benzoici.

Contain ½ grain with either simple sugar or fruit basis (*P.B.* '14); those of T.H. have a red currant basis. Useful as a voice lozenge.

Ammonii Benzoas (*B.P.* '14). $C_6H_5.COONH_4 = 139{\cdot}08$.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**)

In colourless laminar crystals; ***soluble*** 1 in 6 of cold water, 1 in 30 of alcohol, and 1 in 8 of glycerin.

Flavoring.—Glyl Sassafras, Glyl Aurantii Amari; Syrupus Aurantii, Syrupus Tolutanus.

Useful expectorant in chronic bronchitis.

Where pyelitis is associated with cystitis the urine is frequently alkaline, ammoniacal and offensive, and these conditions may be increased by the use of alkalies, while remedies which tend to favour the acidity of the urine such as Ammonium Benzoate or Salicylic Acid, may be preferable on account of their action within the bladder. Boric Acid is also useful.—Tirard.

Mistura Boro-Benzoatis, K.C.H.

Dose.—1 ounce (**30 Cc.**).

Ammonium Benzoate 20 grains, Boric Acid 10 grains, Tincture of Hyoscyamus 30 minims, Infusion of Buchu to 1 ounce.

A useful urinary antiseptic mixture.

TRAUMATIC PARAPLEGIA as a result of wounds in the war. Bladder and rectal functions show a departure from normal. Often there is complete paralysis of micturition. Ammonium Benzoate over long periods does not cause digestive upsets like Sodium Acid Phosphate. A routine mixture:—Ammonium Benzoate 15 grains, Urotropine 10 grains, Hyoscyamus Tincture 30 minims, Syrup of Orange 1 drachm, water to 1 ounce. The urine can generally be kept at a constant level of acidity by this and drainage. Irrigation with 1 in 8,000 Potassium Permanganate, in some cases.—O. H. Gotch, B.M.J. i./23,849.

Magnesii Benzoas $(C_6H_5.COO)_2Mg = 266{\cdot}4$.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**).

White crystalline powder. Antipyretic. ***Soluble*** in water 1 in 30, hardly soluble in alcohol 90%. ***Incompatible*** with Acids, also with Sodium Bicarbonate.

Used as an anti-arthritic for rheumatism and cathartic in cirrhosis of the liver.

Sodii Benzoas (*B.P.* '14); Fr. Cx. Sup. 1920. $C_6H_5.COONa=$ 144·04. Ph. Ned. V. has $\frac{1}{3}$ mol. H_2O.

Dose.—5 to 30 grains (0·3 to 2 Gm.).

In white granular crystals; *soluble* 1 in 2 of cold water.

Two varieties are made, one from the acid obtained from Gum Benzoin, the other from the artificial acid—the cheaper of the two.

Flavoring.—Syl Vanillæ, Glyl Carui, Syrupus Aromaticus.

Incompatible with mineral acids and with Ferric Chloride. It is apt to cause gastric irritation if taken on an empty stomach.

Uses.—*vide* Benzoic Acid. Acute lacunar tonsillitis is stated to be curable by Sodium Benzoate in 12 to 36 hours if given in 5 to 15 grain doses every 2 hours. In pyelitis due to *B. Coli* infection, Sodium Benzoate combined with Hexamine has given good results.

Tablets 2 grains each.

Effervescent Sodium Benzoate.

Dose.—1 drachm. Contains 6 grains in 1 drachm.

***Cryogenin** (T.M. 248320).—*Syn.* META-BENZAMINE-SEMICARBAZIDE. $C_6H_4.CONH_2.NH.NH.\ CONH_2=194{\cdot}06$.

Dose.—3 to 24 grains (0·2 to 1·5 Gm.).

A crystalline body *soluble* 1 in 100 of water and 1 in 25 of alcohol 90%.

A useful antipyretic in all acute fevers. A case of erysipelas migrans successfully treated. Dose 10 to 15 grains per diem during 7 days, also in treatment of phthisis and lingering pyrexia following acute stages of an infection.—H. Sainsbury, L. ii./15,336. A. T. Davies adds his testimony in chest affections. Begins with 5 to 7 grain doses at 3 p.m. to anticipate the evening rise in temperature. If single dose not sufficient give 5 grains thrice daily in the 12 hours—*ibid.* 835.

Acidum Hippuricum. *Syn.* BENZAMIDO-ACETIC ACID, BENZOYL GLYCOCOLL. $COOH.CH_2.NH.CO.C_6H_5=179{\cdot}08$.

Dose.—5 to 20 grains (0·3 to 1·2 Gm.).

This acid, occurring as white crystals, *soluble* in hot water (very slightly in cold—about 1 in 600), melting at 187° C., may be prepared from the urine of herbivora, also synthetically by treating Glycocoll (Amino-acetic Acid, $CH_2NH_2.COOH$, *q.v.*) with Benzoyl Chloride or Benzoic Anhydride.

Hippuric Acid Synthesis Test as regards functional condition of the kidney. The normal amount of Hippuric Acid having been estimated, the patient is given 0·5 Gm. of Glycocoll and 50 Gm. of Hippuric Acid. Analysis of 24 hours' urine should then show an excess over normal of about 0·74 Gm., the normal being 0·4 Gm. When the figure is lower the hippuric function is abnormal and probably there is some renal parenchymatous disorder.—P. L. Violle, L.i./21,1239.

Sodii Hippuras. $C_9H_8NaNO_3=201{\cdot}069$.

Dose.—5 to 30 grains (0·3 to 2 Gm.).

A soluble white powder used in gout, gravel, and calculus, as solvent for urates. A powerful depressant in arteriosclerosis.

Prepared by Corfield and Melhuish in a similar manner to the Lithium Salt (*q.v.*), except that it was found necessary to extract the dried mass with 97% Alcohol. This crystallised with $1\frac{1}{3}$ molecules of water.

Ammonium Hippurate and **Calcium Hippurate** are salts with allied properties to the Sodium compound.

Acidum Phthalicum. $C_6H_4.(COOH)_2=166{\cdot}048$.

Dose.—20 grains 4 hourly. Has very slight anti-rheumatic effect.

Benzoyl Peroxide, $C_6H_5.CO.O_2.CO.C_6H_5=242{\cdot}08$. A crystalline compound, M. Pt. 103·5°, prepared by the interaction of 100 of sodium peroxide and 180 of benzoyl chloride, at a low temperature. Soluble slightly in water, more so in alcohol.

Uses.—For burns and ulcers 2 to 3% solution in oil.

Methyl Parahydrobenzoate, under the names "**Nipagin**" and "**Sobbrol,**" has been introduced as a preservative for syrups against moulds and bacteria; 0·025 to 0·075% completely protects.—Pharm.Zeit., '26,496, per P.J. ii./26,279.

ACIDUM BORICUM (*B.P.* '14).

Syn. BORACIC ACID, HYDROGEN BORATE. $H_3BO_3=61{\cdot}844$.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**).

In white laminar crystals, or as powder (that known as **Pulv. Acid. Boric. Subtilis** has been passed through a No. 170 sieve); with bitterish taste, made by the action of sulphuric acid on borax (and other borates).

Soluble 1 in about 25 of water, 1 in 3 of boiling water, 1 in 30 of 90% alcohol, 1 in 5 of glycerin at 0° C., 7 in 10 at 100° C., slightly soluble in volatile oils. Insoluble in ether.

May be made into pills with glycerin of tragacanth, or with one fifth of its weight of cream of tartar and water.

Incompatible with sodium salicylate in powder—a borosalicylate is apparently formed.

Uses.—Antiseptic and antiputrefactive. In powder and crystals as dressing to wounds, sores, and skin generally. Boric Gauze contains 10 to 15%, Boric Lint 35 to 45% and Boric Wool 15 to 25%. When mixed with starch it forms a useful "dusting powder" for infants, &c. A little in the socks or stockings prevents the odour of perspiring feet.

As **Eupad** and **Eusol** it was much used as a wound dressing.

Vomiting in gastric dilatation or gastric catarrh of infants has been treated by washing out the stomach with weak Boric Acid Lotion.

Cachets of Boric Acid containing 10 grains (**0·6 Gm.**), as antiseptic before and after bladder operations, have been given in typhoid, also for cystitis. **Tablets** contain 5 grains.

In otorrhœa an alcoholic solution of boric acid is better than the powder.

Fifty per cent. of the acid administered, it has been found, is excreted in the urine within 12 hours, the rest remains in the body for 3 or 4 days and hence may accumulate under repeated dosage.

B. Coli grew with difficulty in sterilised urine after taking Boric Acid *per os.* It is efficient as a urinary antiseptic, its action being apparently unaffected by alkalinity.—A. Jordan, B.M.J. ii./13,653.

RODENT ULCER. A Boric Lotion and Adrenalin Solution applied had remarkable effect. In three weeks the ulcer healed

Boric Acid Poisoning. A teaspoonful taken in error has caused death. Used for lavage, by idiosyncrasy it may prove poisonous.—Rash produced. **Empty the stomach or give an emetic of mustard or Magnesium Sulphate.**

Its local use is sometimes stated to cause eczema.

Fatal poisoning of six babies weighing about 7 lbs. with from 0·8 to 3 Gm. of Boric Acid given in solution in error for water.—P.J., i/27,361.

For its use as a **milk, cream, etc., preservative**—*vide Vol. II.*

Glycerinum Acidi Borici (*B.P.* '14). **Glyceritum Boroglycerini.**

Heat Glycerin 9 (by weight) to not above 150° C., and add Boric Acid 6. Continue heat with stirring until weight is reduced to 10, and add Glycerin (by weight) 10. **U.S.X.** has 31 in 100.

It is readily miscible with water and alcohol. It is used, 1 in 40 of water, as a food preservative. Of value in otorrhœa.

Pessus Glycerini Acidi Borici for vaginal use weigh 90 grains each, and contain 70 grains of Glycerin of Boric Acid with gelatin 10 grains and water 10 minims.

Acidum Boro-Salicylicum.

Boric Acid 3, Salicylic Acid 1. A white powder, ***soluble*** about 1 in 120 of water. Is mostly employed as—

Sodium Boro-Salicylate.

Dose.—5 to 45 grains (**0·3 to 3·0 Gm.**)

Has been given in rheumatic affections.

Liquor Antisepticus, U.S. VIII.

Average dose.—1 drachm (**4 Cc.**).

Boric Acid 20, Benzoic Acid 1, Thymol 1, Eucalyptol 0·25, Oil of Peppermint 0·5, Oil of Gaultheria 0·25, Oil of Thyme 0·1, Alcohol 250 and Water to 1,000. Filtered through talc. Resembles ✱ **Listerine.** (T.M. 463,839 Class 2, 27665 Class 3, 259141 and 294469 Class 48.)

Lotio Acidi Borici, R.O.H. 4%.

A most useful soothing antiseptic lotion for the eyes, bladder, vagina and mouth.

Isotonic Boric Acid Lotion is 2% strength—isotonic with the tears.

Lotio Acidi Borici cum Zinci Sulphate, R.O.H.—

Boric Acid 2, Zinc Sulphate 0·125, Water to 100.

A.B.C. Powder.

Boric Acid, Bismuth Subnitrate, Calomel, equal parts. A stimulant antiseptic dusting powder.

Pastillus Acidi Borici, T.H., *v.* **Glyco-gelatin Pastils.**

Useful in aphthous affections of the mouth and throat.

Pessus Acidi Borici.

Ten grains (**0.6 Gm.**) in each, with oil of theobroma.

Convenient to replace douches after delivery.

✱ **'Solubes' Boric Acid,** 15 grains each. For dissolving in 2 ounces of water as an eye wash, or more for vaginal injection, or lotion to wounds.

'Solubes' Boro-Saline contain—

Sodium Biborate 5 grains, Sodium Chloride 5 grains.

'Solubes' Borax Compound contain—

Sodium Biborate 5, Sodium Chloride $2\frac{1}{2}$, Phenol $\frac{1}{2}$, Sodium Bicarbonate $2\frac{1}{2}$ grains.

$\boxed{\text{B}}$ $\boxed{\text{P1}}$ **'Solubes' Borax and Cocaine Compound** contain—

Sodium Biborate 2 grains, Boric Acid 1 grain, Benzoic Acid $\frac{1}{4}$ grain, Menthol $\frac{1}{100}$ grain, Thymol $\frac{1}{100}$ grain, Cocaine Hydrochloride $\frac{1}{10}$ grain with Sodium Chloride *q.s.* to 10 grains.

Dissolved in 2 or 3 ounces of warm water and used as a nasal or throat spray.

Suppositorium Acidi Borici.
Three grains (**0·2 Gm.**) in each. Useful in pruritus.

Unguentum Acidi Borici—*Martindale.*

	No. 1.	No. 2.	No. 3.
Paraffin (M.Pt. 57° C.)	5	5	5
White Soft Paraffin	5	10	15
Boric Acid, in fine powder	2	3	4

Melt the paraffins, sift the Boric Acid into the liquid, and stir constantly till cold. These three ointments contain the same quantity of Boric Acid, *i.e.*, 1 to 5 of basis.

'No. 1' is used where cavities exist or where a stiff base is needed. 'No. 2' is for use to surface wounds, burns, eczema, chaps, pruritus ani et pudendi, and sores, as an antiseptic dressing and 'healing ointment.' 'No. 3' is for toilet use. '**Boric Cream**' is similar.

The *B.P.* '14 Ointment is far too stiff for general use. A small proportion of Beeswax, *e.g.*, 3%, improves it, as pointed out by J. H. Franklin.

'**Collapsubes**,' *i.e.*, collapsible tubes containing ointments, creams and lubricants, with catheter attachment for applying to the urethra, and with suitable tubes for the uterus and rectum. For general purposes 'Collapsubes' alone are provided. *See* Index for list.

'Collapsubes' are also suitable for introducing ointments into the nose. The patient should put the head well back and press the ointment into the nostrils.

Small size Collapsubes marked* in Index are convenient in ophthalmic surgery.

Unguentum Acidi Pheno-Borici.
Contains $2\frac{1}{2}\%$ of Phenol added to either No. 1, No. 2, or No. 3 Boric Acid Ointment. In some cases this may prove more healing.

Unguentum Lano-Boricum Camphoratum.
Boric Acid Ointment (No. 2) ½ ounce, Hydrous Lanolin ½ ounce, Essential Oil of Camphor 20 minims.

For earache in children. Applied with a brush to the meatus.

Petrolatum Acidi Borici.—*Syn.* BORIC PETROLEUM JELLY.
Boric Acid in fine powder 1, White Soft Paraffin 9.

In Collapsubes with catheter attachment for urethral use or with tube suitable for uterine or rectal use.

Unguentum Demulcens R.N.H.
Boric Acid 5 grains, Glycerin of Starch, Hydrous Wool Fat, and Soft Paraffin of each equal parts, to 1 ounce.

Magnesii Boro-Citras.
Dose.—15 to 30 grains (**1 to 2 Gm.**).

Manufacture.—Dissolve Light Magnesium Carbonate 70 in a solution of Citric Acid 100 in Water 400, add Boric Acid 30, evaporate to dryness on a water bath and powder or scale.

A white powder or colourless scales, readily soluble in water; used as a urinary antiseptic internally for stone, gout, and rheumatism; and 1 with 2 of sugar is prescribed as **Boracite,** or **Pulvis Magnesii-Boro-Citratis Composita.** *Dose.*—60 grains *ter die,* to sterilise the urine 48 hours before operations.

Undergoes some dissociation in the body, with hæmostatic effect, but inferior to the lactate *q.v.*

Sodii Biboras. BORAX. *B.P.* '14, **Sodii Boras** (U.S. X.). *Syn.* SODIUM PYROBORATE, SODIUM TETRABORATE. $Na_2B_4O_7.10H_2O=381{\cdot}434$.
Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

Soluble 1 in 25 water, in glycerin 1 in 1, insoluble in alcohol (90%). ***Incompatible*** with gums, mineral acids, also with cocaine hydrochloride.

Flavoring.—Glyl Pini, Syl Lavandulæ, Syl Rosæ; Syrupus Aromaticus.

Uses.—As gargle in diphtheria, for aphthæ, cancrum oris, and gangrenous stomatitis; pruritus ani and vulvæ, in bromidrosis and fœtid sweating of the feet.

Gouty affections are treated with compresses of saturated solution.

EPILEPSY.—In chronic cases, as an adjuvant to or substitute for Bromide.—J. Taylor, L. i./09,908. Rashes may result. It lessens excitability. Subsequently a mixture of Potassium Bromide and Borax used: benefit marked. Number of fits reduced.—J. McCartney, B.M.J. ii./20,548.

Fits reduced and improvement in mental condition. Periodical explosive outbursts disappeared.—J. McCartney, B.M.J. ii./21,527,617,673. A further report: Borax and Bromide combined with Fowler's Solution. Results satisfactory.—B.M.J. i./23,16. *See also Potassium Borotartrate.*

Considered better than Luminal. Treatment consists essentially of Borax 10 grains and Sodium Bromide 10—15 grains thrice daily. If the fits do not cease in a fortnight, the Borax is increased to 15 grains. After 6 weeks 15 minims of Belladonna Tincture daily are given in addition if necessary, and after 2 months it is reduced and then omitted. The salt mixture is given for a year at least, when the Bromide is gradually reduced. The patient then remains on Biborate for another year. This almost invariably achieves a cessation of fits in adults, but children do not as a rule respond so well.—P. Figdor, L. ii./25,840. See also *ibid.* 892,943.

HYPERTHYROIDISM.—A daily dose of 2 to 4 Cc. of a 5% solution of Sodium Borate taken with meals gave good results.—Jl.A.M.A. ii./25,308.

Potassii Biboras. *Syn.* **Potassium Pyroborate.** $K_2B_4O_7.5H_2O=323{\cdot}552$.

Prismatic crystals, readily soluble in water.

Varicose and traumatic ulcers treated with tri-weekly application consisting of Boric Acid 63 Gm., Potassium Hydroxide 28 Gm., Water 200 Cc., starting with half-strength solution.—Per Jl.Trop. Med., June 1, '26,165. The quantities employed are the calculated amounts to produce Potassium Biborate. The solution contains approx. 58 Gm.

Sodii Boro-Tartras. *Syn.* TARTARUS BORAXATUS.
Dose.—20 to 40 grains (**1·2 to 2·5 Gm.**).

Sodium Biborate 2, Potassium Acid Tartrate 5, Water 15, evaporate until a little of the residue cooled is brittle. Powder and dry at 50° C. Antiseptic and diuretic. May be tried for gout.

Sodii Perboras. FR. CX. Supp. II. $NaBO_3,4H_2O=153{\cdot}881$; derived from the hypothetical Perboric Acid, $HBO_3=59{\cdot}828$. A white permanent powder. ***Soluble*** in water, about 1 in 20, with decomposition.

Manufacture.—Sodium Perborate may be prepared pure by treating Crystalline Borax 380 Gm. with Normal Sodium Hydrate Solution 2,000 Cc. to convert it into Sodium Metaborate—$NaBO_2$, and then adding to the solution 4,500 Cc. of 10 Volume Hydrogen Peroxide Solution. Cool immediately by refrigeration and collect and dry the crystalline precipitate on filter paper.
For details of Assay see Vol. II.

Uses.—Antiseptic and deodorising.

To produce **Oxygenated Water,** 1 kilo yields 104 Gm. or about 72 litres of active oxygen. This quantity will produce 7 to 7·5 litres of '10 volume' oxygenated water. The solution is not acid. It contains Hydrogen Peroxide and Borax. In practice 170 Gm. with 60 Gm. Citric Acid makes a litre of about '10 volume' strength.

These solutions may be used to prepare antiseptic lotions, vaginal injections (about '5 volume' strength), *e.g.*, in leucorrhœa and metritis, and are useful in minor surgery. The dry salt may be used as a disinfectant, deodorant dusting powder.

It has been used for soil-contaminated wounds.

Tonsillitis occurring as complication in typhoid has been treated with Sodium Perborate gargle. 2 drachms to the pint.

Unguentum Sodii Perboratis. 1% in Paraffin Ointment basis. Antiseptic and healing.

Sodium Perborate Tooth Powder. Sodium Perborate 2%, in Precipitated Calcium Carbonate.

Sodium Perborate Mouth Tablets.—Patented method of manufacture No. 1578 of 1912 Tablets containing Sodium Perborate and an acid containing water of crystallisation, *e.g.*, Citric Acid, have the disadvantage of spontaneously decomposing, liberating Hydrogen Peroxide. This patent involves the use of mixtures of Perborate with a dry acid or an acid salt wherein the Perborate is partly or wholly dehydrated, a Carbonate being added. Sodium Bicarbonate may be added to form a stable product. On adding to water an alkaline solution of H_2O_2 is produced.—P.J ii./12,232.

✱**Zoel** (T.M. 373442) **Antiseptic** contains Sodium Monoborate (Metaborate, $NaBO_2$). Antiseptic and deodorant. A white granular substance soluble in water 1 in 18. It is alkaline in reaction and on this account permits a free flow of lymph without coagulating.—L. ii./16,832.

✱**Zymocide** (T.M. 244131).

A liquid antiseptic. Diluted 1 to 5 or 10 of water, is used as a vaginal douche, also as a tooth wash, etc Said to contain Extracts of Golden Seal and Calendula, Zinc Sulphocarbolate, Boric Acid, Witch Hazel. Sodium Thymolate, Menthol, and the Oils of Wintergreen and Eucalyptus.

ACIDUM CARBOLICUM (*B.P.* '14).

Ⓟ*Carbolic Acid and liquid preparations of Carbolic Acid and its homologues, containing more than 3% of these substances, except preparations for use as sheep wash or for any other purpose in connection with agriculture or horticulture, contained in a closed vessel distinctly labelled with the word 'Poisonous,' the name and address of the seller and a notice of the purpose for which the preparations are intended.*

For further details regarding the sale by retail by registered and unregistered persons of liquid preparations sold as Carbolic, Carbolic Acid, Carbolic Substitutes *or* Carbolic Disinfectant *containing not more than 3% of Phenols, see 'Poisonous Substances.'*

ⓅPhenol (*B.P.* '14). *Syn.*—PHENYL HYDRATE, $C_6H_5OH = 94.048$.

Dose.—1 to 3 grains (**0·06 to 0·2 Gm.**)

FR. CX.; Max. single dose, 1½ grains; max. during 24 hours, 4½ grains approximately.

In colourless crystals or agglomerated masses liable to become pink—a little Sulphurous Acid will prevent this for a long time. Neutral to test paper; made by distillation of coal tar. M. Pt. 39 to 40° C. (FR. CX. Supp. 1920, 41° C.).

Antidotes.—Give Sodium Sulphate or Magnesium Sulphate 1 or

2 ounces in ½ pint of water. (They do not act chemically but hinder absorption.) Wash out the stomach with water by a tube several times with great care. Apomorphine as emetic (not always effectual). White of egg, and large doses of any innocuous oil. Calcium saccharate and Caffeine are also antidotes. The former may be freely administered. Amyl Nitrite Sterules, hot water bottles. Camphorated Oil (2 drachms) has been used with recovery.

Iodine is a true antidote. Use within obvious limits the same quantity of Tincture of Iodine as of Liquid Carbolic Acid.

Alcohol lavage is no good; it promotes absorption. The same applies to plain water and glycerin.

Intravenous Saline with addition of Sodium Bicarbonate saved life in a case of inhalation of fumes.

For abstracts from the literature as to the effects of compresses, local use, and inhalation, see Vol. II.

Solubility.—100 parts are liquefied by 10 of water, should form a clear liquid with 30 to 40 of water, and should be completely dissolved by 1,200 of water. Also soluble 3½ in 1 glycerin, 3 in 1 chloroform (nearly), 1 in 2 olive oil, 5 in 1 ether, 6 in 1 alcohol (90%), 2¼ in 1 benzol (nearly), and 1 in about 20 vaseline.

Solubility in Liquid Paraffin. 1% is a saturated solution. More will dissolve warm but throws out again on cooling. Much depends on the specific gravity and viscosity of the Paraffin. It has been thought that the addition of a small quantity of Menthol might form a non-escharotic compound and hence alleviate effect of the Phenol but this is erroneous. A case turned on the subject a few years ago in which a large proportion of Phenol (plus Menthol) had been prescribed as ear drops.

Incompatibility.—A solution of Lead Subacetate gives a precipitate with Phenol, but no change with the Acetate. Other Phenols, Cresols, etc., do likewise, except Pyrogallol. The precipitate is probably a Lead Phenoxide. Add, to prevent it, a trace of Acetic Acid to the Subacetate solution.—G. A. Medley, P.J., ii./26,149.

Flavoring.—Glyl Coriandri, Syl Vanillæ; Tinctura Lavandulæ Composita, Tinctura Cinnamomi.

Uses.—A powerful antiseptic, anti-putrefactive, caustic, and applied locally, anæsthetic. Internally for dyspepsia and flatulence, *e.g.* with rhubarb and nux vomica extract in pill. Also for tetanus and erysipelas, in typhoid fever and diarrhœa in pills coated to render them soluble in the intestines, and in puerperal fever, phthisis, bronchitis, pertussis, and for the gangrenous stage of pneumonia.

As a vaginal injection one in 80 or more of water for leucorrhœa, uterine ulceration, erysipelas, and cancer; cleanses, heals, disinfects and allays pain, and is suitable as a gargle.

Mosquitos are kept away by 1% solution. It also relieves bites of same. 2% is effective for disinfecting instruments, the skin, and for artificial dentures left in soak all night.

ACUTE CORYZA. A 1% spray is useful.

NON-SUPPURATIVE MIDDLE EAR DISEASE.—A 10% solution, with cocaine added, relieved.

SMALL-POX pustules have been touched with liquid acid with good results.

TETANUS has been treated by Phenol injections, but there is no evidence of any effect on the course of the disease—*see* Tetanus.

LARYNGEAL TUBERCULOSIS.—Amputation of the diseased portion of the epiglottis, and under cocaine, pure carbolic acid was applied (four times at intervals of a fortnight) to the ulcerated area, no sign of infiltration or ulceration in the larynx.—P. R. S. M. Laryng. Section, 1911,43.

SAPRÆMIA treated by swabbing out the uterus with a mixture of equal parts of Carbolic Acid and Camphor.—L. ii./09,339.

APPENDICAL ABSCESS treated by swabbing out cavity with pure Liquefied Phenol (after removing appendix if reasonably possible). Subsequently spreading Iodoform (any amount up to ½ teaspoonful) in same, after drying out. A rubber drainage tube ¼ inch in diameter is placed at the lower end of the cavity and an Iodoform gauze strip is packed into same sufficient to fill the cavity: this with the tube is conducted out of the abdomen about the centre of the wound. Subsequently they are removed.—B.M.J. i./11,676.

WAR WOUNDS.—When used pure, cauterizes the surface and is only feebly antiseptic as its combination with albumin drains back all discharges. Solutions 1 in 60 on double cyanide gauze good "in a rush." Painless, but a weak destroyer of putrefactive organisms. Gauze must not be wrung out with the bare hand.—Casualty Station experience.—A. Don, B.M.J. i./16,648.

HÆMORRHOIDS treated by interstitial injection of solution of Carbolic Acid in Liquid Extract of Hamamelis.—*See Hamamelis.*

Ⓟ**Phenol Tablets,** ¼ and ½ grain for internal administration.

Ⓟ**Phenol Solubes,** 5 and 20 grains, on dissolving, produce antiseptic lotions.

Potassium Carbolate, in proportion of 1 molecule added to 3 of Phenol assists solubility of Tablets of this kind.

Ⓟ**Acidum Carbolicum Liquefactum** (*B.P.* '14).

Dose.—1 to 3 minims (0·06 to 0·2 Cc.).

Fifteen parts of water by weight added to 100 of above, *i.e.*, 87% nearly. Sp. Gr. 1·067 to 1·069. This is used as a caustic.

Trouble frequently arises with liquefied phenol crystallising in the winter, when there is a sudden drop in the temperature. Experiments which we conducted showed that the proportions 8-1, 9-1, 10-1, are all apt to separate. Suggestion to make this by adding 20 Gm. of water to 100 Gm. of Phenol, *i.e.* 83·3% by weight. This has Sp. Gr. 1·064 and a melting point after freezing of 6·5° C. (43·7° F.) It would therefore remain liquid in fairly cold weather.—C. T. Bennett, P.J. i./21,472.

Ⓟ**Carbolic Acid, Camphorated.**

Phenol 12, Camphor 4, Water 1.

Melt or rub together till liquefied. Is not miscible with water or glycerin. Antiseptic, and local anæsthetic, serviceable in toothache.

Ulcers produced by 'X' ray burns have been treated locally by a mixture of equal parts of Carbolic Acid Crystals and Camphor.

Caution.—Neither of these is intended for extensive use. They are not suited for applying all over the face! Accidents have occurred.

ACNE.—In bad cases press out the comedones, puncture pustules, evacuate contents, and apply to each the smallest quantity of a mixture of carbolic acid crystals and camphor in equal parts or in proportion of 3 to 2. Subsequent usual sulphur applications.—Phineas Abraham, B.M.J. ii./12,289.

WAR WOUNDS of all kinds, many of them 'large,' treated by application of equal parts Phenol and Camphor—highly spoken of.—I. Feldman and A. J. Walton, L. ii./16,1043.

'Phenolisation' of gas gangrene wounds with Phenol 9 and Alcohol 1, was employed in the war, with Mencière's Solution after.

HYPOPYON ULCERS treated by a mixture of Phenol and Camphor applied with a match.—Bishop Harman, B.M.J. ii./21,737.

Ⓟ***Carbolic Acid Lotion.** *Syn.* PHENOL LOTION.

Liquefied Phenol 1, Water 19 or more as required.

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* But see first par. under Acidum Carbolicum.

Liquor Flavus, L.H.—Naphthol Yellow 'S,' 12½ grains, water 10 ounces. Used for tinting Carbolic Acid Lotion, using 96 minims to the gallon.

Lotio Acidi Carbolici, R.O.H.

Phenol 1 in Water 20, 40, 60 or 100 at 50° C.

Solutio Phenolis, F.I., or Aqua Phenolata, to contain 2% of Phenol. Aqua Carbolisata P. Jap. is this strength.

[P] [P1] **Lotio Acidi Carbolici et Cocainæ.**

Carbolic Acid ½ drachm, Cocaine Hydrochloride ½ drachm, Cherry Laurel Water 1 ounce, Rose Water 3 ounces. For pruritus.

In the later stage of treatment of chronic eczema a Lotion containing Phenol, Liquor Picis Carbonis, Glycerin and Spirit may be used as a stimulant to growth of healthier epidermis.

Ⓟ**Carbolic Oil.**

Phenol 1, Olive Oil 19 (more or less, if ordered). For burns and scalds

Scarlet Fever.—Children suffering with, disinfected by rubbing with 10% Carbolic Oil or Eucalyptus Oil. Tonsils also painted with 10% Carbolic Oil during the first 24 hours.—B.M.J. ii./18,359.

We would suggest caution in such procedure. *See also Therapeutic Index.*

Ⓟ**Lund's Oil,** L.L. *Syn.* Oleum Lubricans. CATHETER OIL. For oiling catheters, Phenol 1, Castor Oil 4, Almond Oil 20.

Surgical Lubricant for catheters, &c.

Starch 4, Glycerin 35, add Water 8½ · heat to boiling, remove from flame and add Boric Acid in powder 2½, warm to dissolve, and when nearly cold add Phenol 1. The Lubricant is non-greasy and has the advantage over oily compounds of not attacking rubber goods. It can be removed by water. It will not attack metal instruments if left in contact for a short time, but is not intended as a coating to store them in—for this, vaseline or liquid paraffin is best.

[P1] **Catheter Lubricant. Meltzer's Formula.**

Triturate Tragacanth 3 with Glycerin 20, add Water 100, and sterilise, then add Mercury Oxycyanide 0·25.

Gargarisma Acidi Carbolici.

Aqueous Solution 1 in 100 or more. For foul breath and sore throat. E.L. has 1 of Glycerol of Carbolic Acid in 40.

Gauze, Carbolic, 5%, is in 6-yard pieces. **Carbolic Gauze Bandages (Lister's)** are also made.

Gossypium Carbolisatum. *Syn,* **Carbolic Wool.**

To prepare this, impregnate Absorbent Cotton 1, under pressure with 1 of an ethereal solution 5%) of Phenol. Spread out and dry rapidly. **Linteum Acidi Carbolici** is also 5%.

For methods of preparing **Catgut and other Ligatures,** *see Vol. II.*

Ⓟ**Glycerinum Acidi Carbolici** (*B.P.* '14). *Syn.* **Glyceritum Phenolis,**

Phenol 1, Glycerin *q.s.* to 5.

Dose.—(not *B.P.* '14) 5 to 15 minims (**0·3 to 1 Cc.**)

(U.S. X. has Liquefied Phenol 20, Sodium Citrate 1, Boiling Distilled Water 1, Glycerin 79.)

The preparation seems to be *unnecessarily strong* for general local use. It is employed as a throat pigment and is applied to wounds and to ringworm. It has been used in acute middle ear catarrh with good result.

For earache a few drops of Solution of Phenol, 6 grains to the ounce of Glycerin (**Guttæ Acidi Carbolici**) slightly warmed, are invaluable.

A solution of Phenol in Glycerin is almost non-caustic and only slightly toxic. See Iontophoresis. Vol. II.

For the itching of eczema, Carbolic Acid 4 grains, Glycerin 40 minims, Alcohol 90% to 1 ounce is often useful, but may irritate.

Carbuncles well treated by applying pledgets soaked in the glycerol. As soon as pus shows, the epithelium is turned back and the part may be later syringed out. No fear of absorption of the Acid owing to hygroscopic action of the Glycerin.—B.M.J. i./09,1481.

Ⓟ**Ravogli's Liniment.** Carbolic Acid 1, Glycerin 2, Alcohol 90% 16, Rose Water to 32. In skin affections.

Ⓟ**Pigmentum Antisepticum.**

For hay fever. Glycerin of Carbolic Acid 1 ounce, Quinine Hydrochloride 30 grains, forms a useful pigment for the nasal passages.

Solution of Phenol 2% in Spirit is used for diphtheritic membrane.

Ⓟ **Iodized Phenol.** **Pigmentum Iodi Carbolicum, Acidum Carbolicum Liquefactum et Iodum —C. H. W.**

Iodine 1, Liquefied Phenol 4. Digest till dissolved. For intra-uterine medication on cotton wool

Chronic discharging sinuses treated by 5 minutes' application of iodized Phenol.—B.M.J. ii./11,1594.

Inoperable uterine carcinoma has been treated after curetting, by application of iodized phenol.

Useful also for ringworm of the scalp. *Carefully distinguish from*:— **Dilute Iodized Phenol Injection.**

As pigment in diphtheria, or as a gargle or inhalation, a much weaker preparation is made containing Solution of Iodine (Lugol's) 2·5, Phenol 1, Boiling Water to 200. Is useful also as a nasal douche in ozœna, and for intra-uterine injection.

Physicians should carefully specify which is required.

Tuberculous Sinuses of ankle joint treated by injecting a solution of strength 320 grains of Iodine in 8 ounces of Liquefied Phenol—afterwards binding the walls together tightly. Important to protect healthy skin. Healed in two weeks.—B.M.J. ii./09,828.

Injectio Acidi Carbolici Hypodermica.

Dose.—5 to 20 minims (**0·3 to 1·2 Cc.**)

Two per cent. strength. This has been used for tetanus, erysipelas, and phlegmonous inflammations of the skin.—Whitla.

Ⓟ**Liquor Sodii Carbolatis.**

Dissolve Phenol 8, Caustic Soda 3½, in Distilled Water 100.

To be diluted with 10 to 20 times its volume of water.

These proportions of Phenol and Sodium Hydroxide are nearly the quantities required by theory, and they will be found to yield a sharp and pleasant mouth-wash.

Ⓟ**Phenol Sodique** is similar.

Fr. Cx. has Carbolic Acid 100 Gm., Sodium Hydroxide Solution 20 Gm. (30% by weight). Water to 1,000 Cc. The Sodium Hydroxide in this is insufficient to combine with the Phenol. The Fr. Cx. preparation, in fact, contains about 8.6 Gm. per 100 Cc. *free* Phenol, only 1·4 of the total 10 Gm. being in the combined condition, whilst the Fr. Cx. 1884 had the correct proportions to make Sodium Phenate.—W. H. M.

Antiseptic Dental * 'Solubes.'

For preparing an extemporaneous antiseptic mouth wash.

Contain Boric Acid, Sodium Phenate, Thymol, Sodium Benzoate, and Aromatic Essential Oils. Employed in the prevention of dental caries and in suppurating conditions. One to be used in a wineglassful of water (preferably warm).

Pastillus Acidi Carbolici. (GLYCO-GELATIN BASIS.)

Contains ½ grain (**0·03 Gm.**) phenol. Antiseptic and stimulant. For ulcers in the mouth or throat, and for purifying the breath.

Perles and Capsules of Carbolic Acid.

Globules of gelatin containing in oil, one grain (**0·06 Gm.**) and two grains (**0·12 Gm.**) of Phenol in each. *Dose.*—1 or 2.

Pilula Acidi Carbolici.

Phenol 2, Powdered Liquorice 1, Powdered Althæa 1. In grains for one pill, in grammes for 15 pills.

Smelling Salts, Carbolised.

Phenol 24, Ammonium Carbonate 16, Strong Solution of Ammonia 44, Oil of Lavender 1½, Camphor 3, Pine Sawdust (sifted), *q.s.* For coryza, hay fever, influenza, &c.

Anti-Catarrhal Salts.

Phenol 1, Eucalyptus Oil 1, Pumilio Pine Oil ½, Strong Iodine Solution ½, Camphor 1, Ammoniated Alcohol 2, Pine Sawdust 2 or *q.s.*

Ⓟ**Resina Acidi Carbolici,** R.D.H.

Resin 4, Carbolic Acid 4, Chloroform 3. Dissolve and filter.

This is used as an obtundent and a temporary antiseptic filling Method.—Syringe out all food from the cavity and remove as much decay as possible. Apply on a wool pledget to relieve toothache.

Suppositorium Acidi Carbolici (*B.P.* '14).

Phenol 0·8 Gm., White Beeswax 0·5 Gm., Oil of Theobroma, *q.s.* for 12.

Suggested to omit wax. Melt the Cocoa Butter, allow to cool with stirring until it shows signs of solidification, by becoming less transparent (at about 25–26° C.), add the powdered Phenol, and, after stirring until dissolved, pour into moulds.—H. Bringle and L. H. Boardman, Brit.Ph.Conf., 1927, per P.J., i./27,760.

Trochisci Acidi Carbolici (*B.P.* '14).

One grain (**0·06 Gm.**) with Sugar basis, lemon flavored. For sores in mouth and throat.

Unguentum Acidi Carbolici (*B.P.* '14).

Phenol 3% in White Paraffin Ointment. For ulcers and parasitic skin diseases.

An ointment made with Almond Oil or Adeps Lanæ instead of the Glycerin in the '98 B.P. formula is satisfactory.

🄳🄿1**Unguentum Acidi Carbolici cum Cocaina.**

Liquefied Carbolic Acid 20 minims, Cocaine Hydrochloride 10 grains, Soft White Paraffin 1 ounce.

Ⓟ**Unguentum Acidi Carbolici cum Hydrargyri Perchlorido.**

Liquefied Carbolic Acid ½ drachm, Mercuric Chloride 2 grains, Olive Oil 2 drachms, Zinc Ointment to 1 ounce.

Both the above are used for pruritus.

Unguentum Acidi Carbolici cum Menthol.

Carbolic Acid 2, Menthol 1, Cold Cream 100.

For eczema with much itching.—H.

Vapor Acidi Carbolici.

20 drops of Liquefied Phenol in a pint of water at 60° C. Inhaled or as a spray, in pertussis and for throat ulcers It lessens and disinfects the expectoration in bronchitis and gangrenous lung.

Ⓟ**Preservative Solution** for Anatomical Specimens, *e.g.*, for injection into the aorta.

Phenol 1, Glycerin 4, Methylated Spirit 5.

Acidum Sulphocarbolicum. $C_6H_4.OH.SO_3H=174{\cdot}112$.

Syn. PHENOL-SULPHONIC OR SOZOLIC ACID.

Prepared by the action of strong sulphuric acid on phenol. The *para*-acid is produced in the warm (the *ortho*- when working in the cold), crystallises with difficulty, dissolves readily in water, alcohol, and glycerin, and is a strong antiseptic and disinfectant.

In gingivitis and pyorrhœa a 3% **solution** is useful, reduces swelling and arrests flow of pus.

A 33% **solution** has been sold as **Aseptol.** Principally *para*-acid with only about 6% *ortho*-. To separate *ortho*- and *para*- acids utilise different solubilities of Mono-barium Salts—(SO_3H Salts)—that of the *ortho*- body crystallises out first. The *ortho*- magnesium compound is more soluble than *para*-.

See also Water Analysis, Vol. II. for its use as a reagent for Nitrates.

Cupri Sulphocarbolas.—*Syn.* CUPRI ASEPTOL.

$(C_6H_4\,OH.SO_3)_2\,Cu + 6H_2O=517{\cdot}794$.

In light green crystals, soluble in water, a useful hæmostatic or antiseptic lotion, or astringent injection, ¼ to 1½%.

CHOLERA has been treated with small doses (1/24 grain per hour).

Sodii Sulphocarbolas (*B.P.* '98). SODIUM PHENOL-PARASULPHONATE $C_6H_4OH.SO_2ONa,2H_2O=232{\cdot}093$.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**).

In white rhombic crystals, somewhat like magnesium sulphate.

Soluble 1 in 5 of water, in alcohol 90% 1 in 130, by experiment.

Flavoring.—Diluted, it has little taste.

Uses.—In dilatation of the stomach due to flatulence and fermentation. For flatulence, the dyspepsia of phthisis, and in tonsillitis 5 to 10 grains every 2 hours have been given.

Carbolic saturation to prevent the growth of streptococci in the circulating fluids. 20 to 25 grains of Sodium Sulphocarbolate needed for an adult every two hours. Treatment is stopped immediately there are any signs of Carbolic poisoning.—T. S. Wilson, B.M.J., ii./27,57.

Zinci Sulphocarbolas (*B.P.* '98). ZINC PHENOL-PARA-SULPHONATE; ZINCI PHENOLSULPHONAS, $(C_6H.OH.SO_3)_2Zn,H_2O=429{\cdot}604$. The commercial salt contains $8H_2O$ (was in U.S. IX.).

Crystals in rectangular colourless plates. ***Soluble*** 1 in 2 of water In Alcohol 90% 1 in 3, by experiment.—W.H.M.

In gonorrhœa and leucorrhœa; 2 or 3 grains per ounce for injection.
'Solubes,' 2 and 10 grains (**0·12 and 0·6 Gm.**), produce 2 and 10 ounces or more respectively of lotions for external use or injection.

Tribromophenol.—*Syn.* BROMOL. $C_6H_2Br_3.OH = 330{\cdot}712$.
Dose.—½ to 2 grains (**0·03 to 0·12 Gm.**) in pill.

Manufacture.—By adding Bromine 120, in small portions, to Phenol 53, dissolved in water, *q.s.*, with continuous stirring and recrystallising the product from spirit.

In long silky needles, nearly insoluble in water, soluble 1 in 3 of alcohol 90%, 1 in 1 of ether, 1 in 3 of chloroform and glycerin; also soluble in fats and oils. M.Pt. 85° C. Used alone is strongly antiseptic; ointment (10%), oily solution (1 in 30). Is not dissolved by gastric juice, and is used as an intestinal disinfectant and in typhoid, also in minute doses for cholera infantum.

Tribromophenol-Bismuth.—*Syn.* **Bromphenobis.** *XEROFORM. (T.M. 216423/1899.)
$(C_6H_2Br_3O)_2.Bi.OH+Bi_2O_3$(?). P.Ital. IV., P.G. VI., Ph.Ned. V. (also P.Jap. IV. but without formula), P.Helv. has $Bi_2C_6H_3Br_3O_4$.
Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

Manufacture.—The British Patents 13291 of 1892 and 15361 of 1894 have lapsed.

The details of procedure generally given are misleading. A yellow preparation containing about 50% of Bismuth Oxide can be made from Bismuth Subnitrate by the following method.

A boiling solution of Bismuth Subnitrate 12, concentrated Nitric Acid 20 by volume, and water 80 is rapidly added, with stirring, to a hot solution of Tribromphenol 13, in Caustic Soda 12 and water 200. If the resulting liquid is not slightly alkaline it must be quickly made so by adding Caustic Soda solution, since heating in presence of Nitric Acid gives a product of red colour. The mixed solutions are heated on the water bath for several minutes, when the yellow Bismuth Tribromphenol settles out. It is filtered off hot, washed with warm water, and finally with a small quantity of spirit, and dried.

Many experiments were carried out in an attempt to prepare a Bismuth Tribromphenate of definite composition and quite free from Tribromphenol, but these were all unsuccessful; washing with unlimited quantities of alcohol always altered the colour of the substance, finally giving a substance with a very high content of Bismuth.—From experiments conducted in the author's laboratories, 1923.

For further theoretical considerations, see Edn. XVIII, p. 23.

TESTS.—(Pharmacopœia Helvetica). Citron yellow or orange yellow powder, almost tasteless and odourless The alkaline solution filtered and acidified with hydrochoric acid gives a floculent precipitate which on recrystallising from dilute alcohol melts at about 91° C.

If 0·5 Gm. Bismuth Tribromphenol be shaken with 5 Cc. Alcohol, 1 Cc. of the filtrate on diluting with 15 Cc. of water gives neither opalescence nor a precipitate of Tribromphenol.

Characters.—A yellowish insoluble powder, with faint odour and taste, containing bismuth oxide and tribromophenol in nearly equal proportions. An intestinal antiseptic, *e.g.* for cholera.

Gauze, Bromphenobis. 10%, 6-yard pieces.

Phenosalyl.

The Ⓟ following is similar.—Phenol 90, Salicylic Acid 20, Lactic Acid and Menthol of each 1, mix by heat. 0·2—0·4% in conjunctivitis and in eczema 1%.

Trichlorphenol.—*Syn.* TRICHLORPHENIC ACID. $C_6H_2Cl_3.OH$.
White crystals, with pungent taste; soluble 1 in 1 alcohol, 2 in 1 ether, 1 in 9 glycerin, fixed and volatile oils. Ointment or solution 10%.

Para-Monochlorphenol. $C_6H_4Cl.OH = 128{\cdot}497$.

Manufacture.—By passing Chlorine into Phenol 3, kept cool with ice until the product weighs approx. 4. Fractionally distil the product.

Crystalline needles, *soluble* in alcohol and ether, but not in water to any extent. M. Pt. 37° C., B. Pt. 217° C. **Liquid** para-Monochlor-phenol is practically identical and is used similarly. The *ortho-* body boils at 176° C. and the *meta-* melts at 28·5° C. and boils at 212° C.

A powerful antiseptic used in treatment of lupus, phthisis, keratitis, iritis, and is also employed in dental work as an analgesic. A paste for subsequent filling is made with powdered Cobalt and Tropacocaine Hydrochloride of each equal parts, with sufficient Para Monochlorphenol and Zinc Oxide to produce a soft paste. The unpleasant taste may be moderated by Menthol.

5 to 10% in glycerin has also been used for laryngeal catarrh. Inhalations ½ to ¼%.

Unguentum para-Monochlorphenol.

Para-Monochlorphenol 1, 2 or 5, Soft Paraffin 50, Hydrous Wool Fat 50. Chilblains are well treated with this and solution; *cf.* Therapeutic Index. To cover the odor we found Lavender Oil 5% useful.

✱ **Soloform.** (T.M. 368583), 'SOLUTIO TRI-IODO PHENIC ALCOHOL,' R.V.I. A preparation of **Tri-iodophenol** $C_6H_2I_3OH$, used for making lotions and gargles.

✱ **Dimol.** (T.M. 408144). *Syn.* **Dimethyl-methoxyphenol,** $C_6H_2(CH_3)_2(OCH_3).OH = 152{\cdot}096$.

Dose.—In Tablets (Pulverettes) containing 1 grain—2 to 4 with water after each meal; also in *Syrup* strength 0·3 grain per drachm. A powerful bactericide for intestinal affections.

Stated to have a C.A. Coefficient (Rideal-Walker method) of 35. It has been well spoken of in dysentery, colitis and intestinal toxæmias generally. It is described as Dimethyl-methoxyphenol $C_6H_2\ (CH_3)_2\ (OCH_3).OH$ in combination with tri- and tetramethylphenols. The preparation is voided in the fæces unchanged.

Chronic intestinal stasis treated by Dimol as an antiseptic.—Sir W. Arbuthnot Lane, Pr., May. 22/305.

Summer diarrhœa in infants treated by **Dimol Syrup**; 1 drachm doses for babies 9 to 15 months, and ½ drachm for babies 3 to 9 months, every 4 hours.—A. N. M. Davidson, L. ii./22,1112.

E. W. Ainley Walker writes that he has no connection with Dimol or other antiseptic of commerce.—L. i./22,404.

Duodenal lavage conducted with the following: Sodium Sulphate 360 grains, Dimol Powder 160 grains, water 40 ounces.—J. T. A. Walker, Pres., Feb. 23,70

The lavage solution *in vitro* found capable of killing Dysentery organisms.—H. C. Brown, L. i./23,382.

THE ACTION OF CERTAIN ALLEGED INTESTINAL ANTISEPTICS.—Neither Dimol, Kerol, Izal, or Yatren were found to exert any appreciable effect on the total numbers of living ærobic organisms in the fæces, when administered by mouth in adequate doses. The first three were found to exert on fæces *in vitro* an antiseptic action much greater for coliform bacilli than for streptococci, the concentration of the drugs being considerably higher than in the intestinal tract, which presumably follows their administration by the mouth. Yatren had no evident action whatever in any dilution employed. "Specific and detailed evidence as to the alleged action of these drugs should be published in support of the claims constantly made for them."—L. P. Garrod, B.M.J. i./26,369; see also *ibid.* 505.

Chronic nasal catarrh in children treated with improvement.—J. E. Spence, 'Medical Officer,' May 14/27.

Dimol Ointment found useful as a bactericide in cuts and abrasions, and for insect bites in the tropics.—D. Walsh, Jl. Trop. Med. & Hyg., Feb. 1/24.

Dimol Dentifrice, Pastilles and Dusting Powder are also made.

ACIDUM CARBONICUM.

CARBON DIOXIDE, CARBONIC ANHYDRIDE. $CO_2=44$.

Carbon Dioxide in the **gaseous condition** in small percentages has been advocated for use therapeutically, *i.e.*, when used in dilutions of 4 to 6% with air it stimulates expiration, acts as a cardiac stimulant, exerts an indirect effect as a sedative and possesses the property of toning up a weak pulse.

It has also been inhaled in ozæna and nasal catarrh. It is believed to act as an antiseptic in such cases.

After use of an anæsthetic and operation Carbon Dioxide inhalation properly diluted with air is beneficial and with care a safe treatment. Augments breathing which ventilates the anæsthetic out of the blood. Has stimulant effect on circulation.—Jl.A.M.A., Mar. 20/20, p. 783, per Pres., Feb. 21, 41.

In concentration of about 5%, a valuable respiratory stimulus, used specially to accelerate pulmonary elimination of poisons or drugs, *e.g.* Carbon Monoxide, Ether and Alcohol. Valuable in treatment of empyema.—L. i./26,1052.

In general anæsthesia as an aid.—J. S. Lundy, Jl.A.M.A. ii./25,1953.

Carbon Dioxide 5% with Oxygen 95% (some employ even 25%) used as a control of respiration in anæsthesia; also in asphyxia of the new-born, alcoholic intoxication and Carbon Monoxide asphyxia. The mixture is not used 'straight,'' but is added to air or Oxygen from another cylinder.—Yandell Henderson, B.M.J. ii./25,1170; see also *ibid.* 1181 *et seq.* and 1186.

Perirenal inflation with 500 Cc. of CO_2 or oxygen (CARELLI Method)—former in preference as it is rapidly absorbed. The procedure is of utility for taking X-ray photos. The kidney lies like an island in a lake of air.—F. Hernaman-Johnson, B.M.J. i./22,91.

'Carbonic Snow' *i.e.*, Carbon Dioxide in the semi-solid condition, formed as the gas evaporates from a storage cylinder, is much employed therapeutically.

The procedure is known as **Refrigeration** or **Chrymotherapy** (κρυμός=frost). The gas cylinders containing some 20-30 pounds (7 lb. cylinders are also filled and may prove more convenient) at a pressure of about 950 lbs. to the square inch (65 atmospheres), yield the snow on opening with a temperature —79° C. (—110° F.), which by collecting in a suitable receptacle can be formed into a stick or crayon like an ordinary candle, or may be compressed into a mould and cut any shape with a knife. The cylinders should be mounted on a stand with the stopcock on a lower level than the opposite end so that the liquid gas covers the inner orifice of the valve.

Crayons, Method of Making.—The snow evaporates slowly—a crayon 5 by 1 inch will last about 1 to 2 hours. As many as thirty applications with this size can be made. The temperature of the crayon is *constant*. A towel is folded into three and wrapped round an ordinary ruler—the ruler is then removed and the tube thus produced is bound on to the valve of the CO_2 Cylinder, the gas is turned on and the towel tube fills with the snow. The frozen gas may then be pressed into a piece of Vulcanite or Celluloid Tubing about 1 inch in diameter with a ruler. A cardboard postal tube or roll of blotting paper (several thicknesses) will also serve Cover end of crayon with lint for handling. Can be pointed with a pen-knife or shaped by rubbing against the side of a vessel, *e.g.*, copper steriliser—containing hot water.

Moulds may also be made of the shape of an umbrella ferrule with rods to fit.

An old glove finger has been suggested for collecting the CO_2 by tying on to the vent of the cylinder. When completely filled and rigid, remove and with a sharp knife cut the end of the finger off at about 1½ inches from the point, thus exposing a corresponding length of the crayon, which can be used to the part, the rest of the glove finger serving as a holder.

Hall-Edwards' Collector and Applicator.—The collector consists of a tube formed from a sheet of perforated zinc or tin, inside which is a tube of copper-wire gauze: between the two is a layer of felt. The complete tube is furnished at the upper end with a brass mount slightly tapered internally, and is about 8 inches long and 1¼ inch in diameter. At the lower end there is another brass mount. over which—by a bayonet-catch—a vulcanite end can be attached, this constituting the mould for compressing the snow. The open end of this mould is stoppered by a vulcanite plug during collection. By a tapered brass plug the gas bottle is attached to the upper end of the collector, and the turning of the key releases the gas. When there is sufficient snow in the collector, a vulcanite rod fitting the lower end is passed down the centre, and the snow falling into the mould is compressed. The bottom vulcanite plug is now removed and the vulcanite rod pushed through the hole, thus releasing the tablet. By regulating the pressure, tablets can be made of varying thicknesses. The applicator is made of vulcanite except the piston, which carries the plunger, the collar which guides it, and the spring which keeps it in position. The lower end of the tube is bevelled to form a thin edge, and the plunger is held up by a spring at about ¼ inch from the end of the tube. The plunger is perforated to allow of escape of gas and can be brought to a level with the end of the tube by pressure on knob The ease of application is a feature of the instrument. the applicator being held like a hypodermic syringe, and pressure being applied by the thumb.—C D. i./10,387, *v. also* L ii/11.87

Uses.—For removal of nævi, moles and blemishes, lupus erythematosus, lupus vulgaris, rodent ulcer, and warts (for last mentioned long application necessary). Also employed for trachoma and chronic localised eczema. A single application usually suffices. The thawing out is usually more painful than the freezing.

NÆVI.—In the case of an ordinary capillary nævus the crayon is roughly shaped to that of the nævus—or slightly larger; it is applied and firmly pressed down for, on an average, 40 seconds. If there is bone immediately beneath, a shorter time will do. For a cavernous nævus the end of the crayon is made the same size or slightly smaller than the area of the growth. A long application with deep pressure should effectually freeze the whole mass.

KERATOSIS accompanying 'X' ray dermatitis. Brief applications answer well. The hard white frozen surface, on removing the crayon, shows a depression according to the amount of pressure employed—the depression gradually returns to its normal shape. The treated area then becomes firmer and in two or three minutes swollen. A wheal forms with acute hyperæmia within half an hour and a vesicle usually within an hour, applying thirty seconds or longer, this will almost certainly be followed by scarring. An intense superficial destruction is obtained by a second application immediately after the tissues have thawed out.

Boric Acid Ointment is used for after-treatment. If blister forms the fluid is removed within a few days, the crust forming should be allowed to fall off. The scar ultimately is pale, soft and pliable.

CHRONIC LOCALISED ECZEMA has been treated and the method may be applied energetically in trachoma without risk. The lid is everted and separated from the globe by a non-conducting spatula—the pencil is lightly pressed down on to the part of the conjunctiva to be treated for 15 to 30 seconds —the longer time being reached by gradual increase with each weekly sitting.

CORNEAL ULCERS.—In treating these the surface of the ulcer is carefully touched with the pencils. It is not necessary to instil cocaine. If patient complains of discomfort the eye can be bathed with cold boracic lotion. The surface of the ulcer becomes white and raised, within twenty-four or thirty-six hours this 'slough' separates, leaving a clean healing ulcer. Infiltrations disappear from the surrounding healthy cornea and hypopyon vanishes. The resulting opacity is less than in the case of similar ulcers treated on other lines. After the application of the snow, pads and bandages are used instead of fomentations, and atropine sulphate 1% is instilled once daily. The method is not advised for marginal or ring ulcers.—Pres. June, 1911.

GENERAL PSORIASIS.—Patches on each wrist removed by 30 seconds' application—perfect cure in three weeks.—B.M.J. i./11,416.

HÆMORRHOIDS.—Carbon Dioxide satisfactory.—B.M.J. i./12,120.

ORIENTAL SORE has been treated. Perseverance is necessary as there is strong tendency to recur. A solution of the Snow in Ether applied with a cotton wool tampon has been used in America, but this does not produce any greater intensity of cold nor reduce time of exposure.—J. L. Bunch, B.M.J. ii./13,1006.

A mixture of Acetone and Carbon Dioxide Snow painted on with camel hair brush may be used to freeze superficial tissue and destroy syphilis virus in case of chance infection, *e.g.* of the fingers.—W. Knowsley Sibley, Pres. Apl./21,159.

For large port wine stains and moles where many applications would have to be made LIQUID AIR (*q.v.*) is said to be more satisfactory.

ALOPECIA AREATA of 3 to 7 years' duration well treated with Carbon Dioxide Snow. Hair started to grow after three or four applications within 3 weeks.—Per Jl.A.M.A. ii./25,552. See also Pres. Jan. '26/35.

As a preservative of eggs the gas is useful.—H. E. Jones, B.M.J. i./26,848.

For details of the presence of excess of CO_2 *in the air and its effect on the human organism on inhalation, see Oxygen.*

ACIDA CHLORACETICA.

Acidum Monochloraceticum. $CH_2Cl.COOH = 94{\cdot}481$.

Preparation.—By Chlorination of Acetic Acid in presence of Iodine at water-bath temperature, subsequently fractionating and reserving the 180°—188° C. fraction.

Deliquescent white crystals, M. Pt. 63° C., or liquefied. It blisters the skin, and is a caustic for warts and corns. *Soluble* with ease in water, alcohol, and ether.

In the electrolysis of Sodium Chloride, as used in treatment of gonorrhœa, this acid is less decomposed than the salt, and it is able to neutralise the alkalinity which would deposit against the urethral membrane. *cf.* Gonorrhœa, Therapeutic Index.

Acidum Dichloraceticum. $CHCl_2.COOH = 128{\cdot}93$.

A colourless caustic for venereal sores.

Acidum Trichloraceticum. **U.S. X., P. Helv., Ph. Ned.V., P. Jap.,** $CCl_3.COOH = 163{\cdot}379$.

Prepared by chlorination of acetic acid, or by the action of fuming nitric acid on chloral hydrate.

In deliquescent crystals, M. Pt. 55° C. (lower if moist), and boiling at 195° C., very soluble in water, alcohol and ether.

Uses.—A quick escharotic for venereal and other warts. As lotion or gargle, 1 to 5% aqueous solution may be used, and as strong as 1 in 1 or 2 of glycerin with a little iodine and potassium iodide has been employed for temporary application.

In gonorrhœa, solution 1% or less is used. Tobacco stains on the teeth can be removed by its cautious use (25% solution).

RIGG'S DISEASE—incipient stages—this acid applied to the gum after cleaning with Hydrogen Peroxide Solution 10 or 20 Volume, is a good remedy. The action is probably dual—killing the infective organisms and dissolving the Calcium Carbonate of the tartar. With the disappearance of the tartar the presence of bacteria is excluded. Should be tried before sound teeth are sacrificed.

TONSILS, DISEASES of.—Where operative treatment is not permitted, the use of Trichloracetic Acid applied on a right angled wool-carrier and passed deeply into the crypts, has been found of value in reducing the size of the tonsil and adding to the comfort of the patient.

VINCENT'S ANGINA.—Trichloracetic Acid stated to be specific.—T. J. Gallaher, Pres., Aug. 1920. Chromic Acid applications (saturated solution) also advised. Afterwards gargle with water, later with Hydrogen Peroxide diluted 1 : 10. Further bibliography *ibid.* Feb., 1921,63.

LEPROTIC LESIONS treated with applications of a solution—1 in 1 for centre of large thick nodules, 1 in 5 for painting on face, and 1 in 3 generally useful. Must not be too strong or brush too wet. When dry, skin should show a white powdery appearance, otherwise repeat 2nd or 3rd time. May be repeated after 10 days.—E. Muir, I.M.G., May, '26,216.

RODENT ULCER. A solution of Trichloracetic Acid, 3 drachms in 20 minims of water, applied.—The acid should be washed off after about 3 minutes, and then for 24 hours no soap or water is allowed on the ulcer. The eschar usually peels off in about 22 days.—H. Leslie-Roberts, B.M.J., i./27,794.

For its use as a delicate test for albumin, v. Vol. II.

ACIDUM CINNAMICUM.

Cinnamylic Acid.—*Syn.* **Phenylacrylic Acid.**

$C_6H_5CH : CH.CO.OH = 148{\cdot}064$.

Dose.—Per os, $\frac{1}{20}$ to $\frac{1}{4}$ grain (**0·003 to 0·016 Gm.**)

Intravenously (in oil) $\frac{1}{50}$ to $\frac{1}{20}$ grain (**0·0013 to 0·003 Gm.**).

May be manufactured by the oxidation of Cinnamon Oil or by acting upon Benzaldehyde with Acetyl Chloride. In transparent micaceous crystals, melting at about 130° C., very slightly soluble in water, soluble in alcohol, ether and oils

Preparation of synthetic acid. Tests and reactions.—P.J. i./10,727.

Uses.—Cinnamic Acid has been used to induce leucocytosis. It is mostly given as the Sodium Salt. J. C. Ross used Cinnamon Oil in treatment of influenza.—L. ii./06,1240 ; i./22,252.

Sodii Cinnamas.—*Syn* HETOL. $C_6H_5CH : CH.CO.ONa = 169.053$.

Dose.—3 to 5 grains (**0·2 to 0·3 Gm.**), *per os,* or hypodermically as Glycerin Solution, *v. infra.*

Soluble 1 in 11 water, in glycerin 1 in 10 (*secundum artem*).

Uses.—Pulmonary tuberculosis has been treated by intravenous injection of 0·1 Gm. in 10 Cc. normal saline over lengthy periods (Landerer). The cinnamates have vasodilatory action (Oliver), and in this direction are harmless even on prolonged use.

Cystitis and influenza have been beneficially treated with it.

LEUKÆMIA treated by Sodium Cinnamate. Two cases improved by Sodium Cinnamate intravenously starting with only 1 mgr.—the highest dose being 20 to 25 mgr.—B.M.J.E. ii./22,93.

Glycerinum Sodii Cinnamatis.

Dose.—30 to 60 minims (**2 to 4 Cc.**) by injection.

This 10 per cent. solution in sterilised glycerin is made by heating to not exceeding 180° C. (356° F.) and is employed for hypodermic and intravenous injection in tuberculosis and cancer, the theory being that it causes a general leucocytosis.

The late L. Drage obtained good results from the use of the Glycerin solution, and recovery in two cases of basal meningitis almost certainly tubercular. Children tolerate doses of 10–15 minims daily—given subcutaneously in the back of the neck. This authority also employed the injection in numerous other infective cases —*cf.* **Injectio Sodii ortho-Coumaratis** *postea.*

The papers by the late Lovell Drage in the *Lancet*, *British Medical Journal* and the *Second International Congress of Surgery* at Brussels have been collected in book form, with a preface by Sir Squire Sprigge. It is stated that Lovell Drage had the true spirit of the investigating physician, and that he showed this spirit alike towards the problems of medical life and towards the solution of scientific questions. Drage felt keenly that it was a reproach to medicine that the mortality from cancer should be so high, and should show signs of rising, at a time when advances in diagnosis and treatment were being recorded. He ardently advocated that the medical treatment of cancer should receive attention, with the hope of co-operation from his colleagues.

“Sterules” of Glycerole of Sodium Cinnamate contain 30 minims (**2 Cc.**) each.

Strontii Cinnamas $(C_6H_5.CH : CH.CO.O)_2Sr = 381{\cdot}742$.

Dose.—2 to 5 grains (**0·12 to 0·3 Gm.**).

A white powder, soluble about 1 in 120 of water and about 1 in 50 of a mixture of glycerin and water equal parts, and about 1 in 100 of alcohol 90%. This has been used similarly to the Sodium Salt.

Sodium Phenyl Propiolate.—*Syn.* THERMIOL. $C_6H_5C{:}C.COONa = 168{\cdot}037$. Is supplied in commerce in 25% solution. Has been used in laryngeal and pulmonary tuberculosis by inhalation of 0·5 to 3% solutions. Note the treble linkage in the side chain indicating a more active body than the parent Cinnamic Acid.

Cinnaldehydum.—$C_6H_5CH : CH.COH = 132{\cdot}064$. *Syn.* **Cinnamal, P. Austr.** *Dose.*—1 minim (**0·06 Cc.**).

The aldehyde from cinnamon oil. A colourless liquid with cinnamon odour. Sp. Gr. 1·054 to 1·056. *Soluble* in alcohol in all proportions.

Capsules (Gelatin) of Cinnamic Aldehyde, 1 minim, have been used in malignant disease. Drage reported on its value in tuberculosis, especially in pulmonary cases.

Acidum Coumaricum.—*Syn.* o-**Hydroxycinnamic Acid.**

$C_6H_4OH.CH : CH.COOH = 164{\cdot}064.$

Ortho-coumaric acid forms brownish crystals, melting at 200° C., the meta- melts at 191° C., and the para- at 206° C.

It was thought that the sodium salt of this hydroxycinnamic acid would prove more powerful than the cinnamic salt which had already yielded good results in the treatment of malignant diseases (see Glycerinum Sodii Cinnamatis). This opinion was deduced by comparing the action of salicylic acid (hydroxybenzoic acid) with that of benzoic acid (introduction of the **Hydroxyl** grouping). Furthermore it may be noted that ortho-coumaric acid stands in the same relationship to salicylic acid as cinnamic does to benzoic acid—introduction of the **Acrylic** grouping.

Soluble very slightly in chloroform, in alcohol 1 in 12 or less, in ether 1 in 36, hardly soluble in water.

The Rideal-Walker coefficients to *B. typhosus* for the acids in 40% alcohol are : ortho- 6·5 ; meta- 4·5 ; para- 4·0.—J. T. A. Walker.

Uses.—For general treatment and as a precursor to and after operation (for three months if necessary) in malignant disease. The sodium salt is not so painful on injection as the cinnamate. It is stated to prevent proliferation of cells in cancer.

The coumarates have action of vasodilators, and they may be taken for prolonged periods without harm.—Oliver.

Sodii Ortho-Coumaras. $C_9H_7O_3Na = 186{\cdot}053$. This salt for injection in cancer and tuberculosis is best used as

Injectio Sodii Ortho-Coumaratis ; a 22% aqueous solution.

Dose.—25 minims (**1·5 Cc.**).

Injected thrice weekly when possible between the malignant growth and healthy subjacent tissues or in the course of lymphatics proceeding from the region of the growth, or over a large serous sac like the peritoneum.

This injection is a clear yellow liquid, perfectly stable.

In glandular and early cases of pulmonary tuberculosis Drage reported good results with the injection. In cancer Drage held that very few drugs exert more definite action.

Injections were made into the pleural cavity, in a case of malignancy either in the pleura or in the root of the lung, after removal of large volumes of fluid. There was some sign of efficacy, though transient.—A private communication (1923).

Sodium Ortho-Coumarate Sterules contain 25 minims of the above injection. They are also made with **Kerocain** $\frac{1}{5}$ grain : also with **Kerocain** $\frac{1}{5}$ grain and **Adrenalin Solution** 10 minims. Drage obtained good results with this injection.

'Fibrocoumarin' Sterules contain **Sodium Orthocoumarate** injection 25 minims, **Thiosinamin** 2 grains and **Kerocain** $\frac{1}{5}$ grain. This is especially suitable where tissue is cicatricised.

'Fibrocoumarin' Sterules with **Adrenalin Solution** 10 minims. Favourable results have been obtained by injection of this preparation into the growth. Drage stated it is the most active local agent he had used. *cf.* also **Cicatricine** for a simple solution of Thiosinamin.

*__Tylmarin__ (T.M. 283966). *Syn.* **Acidum Acetyl-o-Coumaricum.**
$CH_3COO.C_6H_4.CH : CH.COOH = 206{\cdot}08$.
Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**) thrice daily after food.
Colourless crystals melting at 150° C.

This substance constitutes a stage further in the Cinnamic and Coumaric treatment. In view of advantages that acetyl-salicylic acid has over salicylic acid, ortho-coumaric acid has been acetylated.

Soluble only slightly in water (easily in presence of alkali, but dissociation occurs), in alcohol 90% 1 in 19, in ether 1 in 50, in chloroform 1 in 16.

Uses.—Has been used in malignant disease, and for tuberculosis and as a general intestinal antiseptic.

Any early case of glandular or pulmonary tuberculosis which can be cured by open-air treatment can be successfully treated with this drug accompanied by injections of Sodium Orthocoumarate—it is a valuable adjuvant. The diminution in size of lymphatic glands secondarily infected was very marked, and fresh invasion prevented (Drage).

The carbolic acid (Walker-Rideal) coefficient of Tylmarin in 40% alcohol with *B. typhosus* was found to be 4·5.—J. T. Ainslie Walker.

Tylmarin Cachets and **Tablets** contain 5 grains (**0·3 Gm.**).

Tylmarin Dusting Powder has been used to cancerous growths which have broken down. Large open sores can be materially benefited.

Tylmarin Gauze in one yard pieces is prepared for packing for local use.

No toxic effects have been experienced in the use of any of these methods. A patient with sarcoma in the palate, rendering him practically deaf, received 3 injections of Sodium Coumarate and 5 grains of Tylmarin twice daily. Condition immensely improved. Two cases of carcinoma of the œsophagus improved, also cases of carcinoma of the breast. Success is more likely with definite chemicals than with undefined ones.—Drage, **L.** ii./08,1367.

Tylmarin Sodium, *Syn.* SODII ACETO-COUMARAS.
$C_6H_4O.CO.CH_3\ CH : CH.COONa = 228{\cdot}069$.
Dose.—5 grains (**0·3 Gm.**).

This substance would be decomposed in the stomach yielding Tylmarin in a nascent condition as initial product. Needle crystals very ***soluble*** in water (1 in less than 1) and in Alcohol (90%) 1 in 2. Might also be tried by hypodermic injection.

Tylmarin-Quinine. *Syn.* QUININÆ ACETO COUMARAS.
$C_{20}H_{24}N_2O_2.\ C_6H_4O.COCH_3.CH : CH.COOH = 530{\cdot}288$.
Dose.—3 to 5 grains (**0·2 to 0·3 Gm.**).

White powder containing approximately 60% Quinine and 40% Tylmarin, ***soluble*** very slightly in water (less than 1 in 800) in Alcohol 90% 1 in 9, in Glycerin 1 in 30. Antiseptic and febrifuge.

Tylmarin-Thorium *Syn.* THORII ACETO-COUMARAS.
$Th(OH)_4[Th(C_6H_4\ O.CO.CH_3.CH : CH.COO)_4]_2 = 2405{\cdot}058$

A buff coloured powder containing approximately 35% of Thorium Oxide prepared by double decomposition between Thorium

Nitrate and Sodium Aceto-Coumarate. For local use in malignant disease.

We conducted some photographic experiments to determine the radio-activity of this substance. It was found that Tylmarin-Thorium and Thorium Oleate (*q.v.*) were about equal in activity, both being slightly stronger than the Nitrate.

Coumarin. *Syn.* COUMARIC ANHYDRIDE. $C_9H_6O_2$=146·048.

This crystalline body which has an aromatic odour and taste is contained in Tonquin beans from *Dipteryx odorata* (Willd.) and *D. oppositifolia* (Willd.). (*N.O. Leguminosæ*), also in Woodruff. It is made synthetically by boiling Salicylic Aldehyde with Sodium Acetate and Acetic Anhydride.

Soluble in alcohol, ether and oils, but not to any extent in water. Sublimes unchanged. One part will disguise the odour of 50 of iodoform.

ACIDUM CITRICUM (*B.P.*'14).

$C_3H_4OH.(COOH)_3$, H_2O=210·08.

Dose.—5 to 20 grains (0·3 to 1·2 Gm.).

Colourless crystals or white powder, 99·5% pure.—**B.P.'14** and U.S.

Lemon juice contains as much as 7 to 9%(30 to 40 grains per ounce).

Soluble.—2 in 1 of water, 1 in 2 of glycerin, 1 in 1½ of alcohol (90%), 1 in 8 of ether, Sp. Gr. 0·735, but much less soluble in 0·720 ether.

For quantities of alkalis to be prescribed with this acid in the form of effervescing mixtures, *vide* NEUTRALISATION TABLE.

Uses.—Relieves thirst in fever. Lemon juice is better than citric acid for scurvy. A useful method of preserving it is to boil the juice, place in stone bottles whilst hot, and cover with a little oil before plugging with a cork. Will keep for months.

In rheumatism and given internally in jaundice.—H.

Diminishes coagulability of the blood (Sir A. E. Wright). *Vide* also Calcium Chapter and *Vol. II.*

To replace Hydrochloric Acid, Citric Acid recommended where it is desired to administer acid to bring acidity of the urine to normal. The amount required would be roughly 7 Gm., in the case of a neutral gastric juice. It can be given in pill form.—B.M.J.E. ii./22,78.

Organic acids, *e.g.*, Citric, Acetic and Tartaric in form of salts suggested for all types of protozoal infections: malaria, Leishmania infections, trypanosomiasis, spirochætoses. These acids are thought to act as powerful katabolic poisons to malarial parasites. Kala-azar parasites experimentally flourish and multiply in citrated blood at 20° C. but die out rapidly at 40°C. Numerous cases of malaria treated without Quinine on these lines, also amœbic hepatitis, without Emetine.—S. L. Rodrigues, Bombay, May, 1922.

Incompatible with potassium tartrate and alkaline carbonates.

Impurity.—Lead should not exceed 20 parts per million (**B.P.'14**).

Lotio Acidi Citrici et Phenolis. Citric Acid 3 drachms, Phenol ½ ounce, Water to 1 pint For cleansing sockets after removing septic teeth.—L. ii./09,1666.

Acid fruit tooth paste better than soap and chalk.—B.M.J. ii./26,864.

Ⓟ*ACIDUM CRESYLICUM.

Cresol (*B.P.*'14). *Syn.* **Cresolum Crudum,** CRESYL, PARACRESYLOL, CRESYL HYDRATE, METHYL PHENOL, METHYL HYDROXYBENZENE, "COMMERCIAL CARBOLIC ACID," &c., $C_6H_4.OH.CH_3$ = 108.064. KRESOLUM CRUDUM P. HUNG, is "ACIDUM CARBOLICUM FLAVUM 100%."

Dose.—1 to 3 minims (**0·06 to 0·2 Cc.**).

A yellowish brown liquid with tar-like odour.

A mixture of ortho-, meta-, and paracresols, forming the principal constituent in crude carbolic acids. **Ortho**-cresol (1 : 2) melts at 31° C. and boils at 188° C. **Meta-** (1 : 3) is a colourless liquid, boiling at 201° C. **Para-** (1 : 4) melts at 36° C. and boils at 198° C. Sp. Gr. 1·04 to 1·05. When distilled 90% should boil at 195 to 205° C.

FR. CX. requires, in the following proportions: Ortho 35, Meta 40, Para 25. P.G. VI. requires at least 50% *m*-cresol $C_6H_4.OH\ (CH_3)$. (1 : 3), also that at least 92% must distil between 199 to 204° C. Method of estimating by converting into Trinitro-*m*-cresol is given.

Cresolo Grezzo, Ph. Ital. IV. The bulk must distil between 180 and 204° C.

Separation of m-and p-Cresol.—Process depends on the fact that only Calcium *m*-Cresoxide is decomposed when the Calcium Salts of *m*- and *p*-Cresol are treated by superheated steam at 105—110° C. *m*-Cresol alone distils over.—Terrisse and Dessoulavy (D.R.P. 267210), ex J C.S.A. i./14,38.

Soluble 1 in 50 water (*B.P.* '14), we find mostly 1 in 70. Miscible with alcohol 90%, chloroform, ether, castor oil, and glycerin in all strengths. Also miscible with almond and olive oil in all proportions, but to make a clear solution we found about 1 in 2½ necessary.

Uses.—The mixed Cresols are less potent in action than Phenol (considered one-eighth as poisonous) and are used in many respects on analogous lines to the latter. Their odour is a disadvantage. "Cresol" is valuable for vaporising into the air in the treatment of whooping cough. Cresol is largely employed in the manufacture of Liquor Cresol Saponatus (*B.P.* '14) and other disinfectants as described later. A small proportion (0·5%), preferably of the freshly distilled Trikresol, *q.v.*, is much used as an antiseptic to add to vaccines.

In whooping cough Vapocresolene to be burnt at night and give Benzol 6 minims to the half-ounce for a child of six, with less doses for lesser ages.—R. L. Ley, L. i./23,255.

Disinfectants.

The nomenclature used by manufacturers in describing their preparations includes the following :—

"*Tar Acids.*"—These are Oxygenated Hydrocarbons including Phenols, Cresols, and higher Hydroxy compounds.

"*Phenoloids.*"—A vague term. The bodies so called *simply consist of phenol and its higher homologues.*

"*Tar Oils.*"—The neutral bodies present, *i.e.*, insoluble in soda.

"*Coke Oven Oils.*"—Contain varying percentages of "Phenoloids" with "Tar Oils."

Disinfectants containing less than 3% Phenol and homologues sold at grocery shops and stores are relatively useless. The public should be protected. More disinfectants are sold by grocers than by chemists.—H. Kenwood, L. i./21,1327.

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* But see first par. Acidum Carbolicum.

Ⓟ***Liquor Cresolis Saponatus** (*B.P.* '14).

Mix Cresol 50 by weight with Castor Oil 35 by weight. Heat to 80° C. Dissolve Potassium Hydrate 8 in Water 7, mix and heat until 1 vol. mixes clear with 10 of Water. Cool and add Water to 100 by volume.

Many formulæ on these lines have been published—some employing Linseed Oil, as in the original Lysol formula. Others proceed without heating, making the Potash Soap first by shaking, adding a proportion of Alcohol and finally the Cresol little by little. Others again, suggest the use of an equivalent smaller proportion of *Soda* instead of Potash. We have conducted many experiments on the matter and find *the B.P. method good.* The P.G. VI. method, which can be completed at room temperature, is also satisfactory, *vide infra.*

To make a *clearly* soluble article it is important to use the best potash available and the best Cresol, otherwise, on diluting with the water, the preparation will not be clear. Soda and Castor Oil will produce a clearly soluble Liquor Cresolis if the Soda be of the best quality, but from our experiments we do not favour the suggestion to use soda for a preparation of this kind.

The *B.P.* '14 liquor is *clearly soluble* in water. A miscible preparation is preferred, though in the past a *milky emulsion* with water was favoured.

The *B.P.* '14 liquor contains too much Soap—equivalent of 860 of Soft Soap to 500 of Cresol. The caustic and oil should be reduced and make a thinner and cheaper preparation.—J. H. Franklin, P.J. i./27,53.

Liquor Cresolis Compositus, U.S. X., is prepared by warming to 70° C. Cresol 500, Linseed Oil 350, with 10 × Normal (Dekanormal) Caustic Potash 22 and 10 × Normal Caustic Soda 88, finally adjusting to 1,000 with water.

Liquor Cresolis Saponatus, P.G. VI., contains 3% by weight of Alcohol (of strength 90% by vol.), and is made as follows :—

Add a solution of Caustic Potash 27 in Water 41, with shaking, to Linseed Oil 120, and then Alcohol 12. Shake frequently at room temperature until saponified. Finally, add Cresol 200 and shake. (All parts by weight.) It may be necessary to allow to stand a day or so.

W. Knight also advises saponifying with the use of spirit, overnight.—P.J. i./26,409.

The disinfecting power of the higher phenols increases in proportion to their position in the homologous series, but their solubility *decreases* proportionately. Bodies, therefore, with the *hypothetical* diphenyl nucleus which have become so popular can only be used as *emulsions* made with vegetable or with Tar Oils, Glue, etc. The use of Alcohol to dissolve reduces activity.—Hewlett.

Cresol Soap solutions are effective in proportion to their content of Phenols as shown by chemical analysis, and presence of organic matter calls for increase of strength, the ratios of increase being for pure Carbolic Acid 1·4, for Cresol Soap solutions 2·4, and for emulsions 8·2.—B.M.J. ii./26,1133.

The **Lysol Patent** specification, 1017/1890 (expired) gives the following methods of preparation :

(i). Tar Oil 100 Gm., Linseed Oil 100 Gm. Caustic Potash Solution (1 in 2) 75 Gm., Alcohol 65 Gm. Boil with reflux condenser until saponified.

(ii). Tar Oil 40 Gm., Common Resin 10 Gm., Caustic Potash Solution 70 Gm., Alcohol 70 Gm.

Post-influenzal cough cured by inhalation of Lysol—about 1 drachm to 4 ozs. of boiling water.—C. Higgens, L. i./15,1204.

These solutions are ***incompatible*** with acids.

Poisonings. **Many cases are recorded, *e.g.*, the following :—**

Apparently about ½ ounce taken Recovery after vomiting and a dose of Magnesium Sulphate The copious vomiting and 3 glasses of milk which had been taken were probably the saving factor. Lavage not conducted.—B.M.J i /13.19.

Antidotes.—Egg albumen, oil, butter. On no account give water except by lavage.

Comparative poisonousness with Phenol.

Lysol usually considered one-eighth as poisonous as Phenol. Brandy given as enema, with recovery, in a case when 2 ounces had been taken.—B.M.J. ii./25,774.

A "Lysol" must contain about 50% Cresols. Products containing 3% or less of Cresols, to be sold by grocers, etc., must not be labelled "Lysol." Result of Lysol Ltd. *v.* Freesol Co., July 15, 1925.—P.J. ii./25,85,91.

The following are some Proprietary and Cresylic disinfectants of commerce :—

Ⓟ*✱**Acrosyl** (T.M. 358720, Class 2).

Ⓟ*✱**Cofectant** (T.M. 349583).

Ⓟ*✱**Creolin** [T.M. 84764 and 87839 (Class 3), also 63869, 81450, 87838 (Class 2) **Pearson** (20% Cresylic Acid)]. (✱Creoline is T.M. 214446, Class 2.)

Ⓟ***Creophen** (Ferris).

✱**Cyllin** [T.M. 256051, 258990, 259683, (Class 3), 299502] **Medical.** *Dose.*—1 to 5 minims (0·06 to 0·3 Cc.). Stated to have a Diphenyl Nucleus.

It is stated not to contain so much as 3% of Phenol or homologues.

Unguentum (Creolin) Cyllin Compositum.—Cyllin ½, Soft Soap 1, Ammoniated Mercury Ointment 4, Soft Paraffin 8.

Cyllin Syrup.—*Dose* for adults 10 to 60 minims, for infants 5 to 10 minims. In infantile diarrhœa encouraging.—L. ii./06,1078.

In chronic eczema 1 in 200 with Lotio Calaminæ Oleosa.—B.M.J. i./09,1341

The Rideal-Walker Co-efficient for Cyllin in respect of *Staphylococcus Pyogenes Aureus* is 9·37.

Cyllin Capsules—1 and 3 minims keratin-coated, have been used in summer diarrhœa, dysentery, colitis and sprue. 'Stomachic' are also supplied.

Ⓟ***Diffusol, Lysol-Martindale.** A soapy solution containing 50% specially purified ortho-, meta- and para-cresols soluble in either hot or cold water in all proportions. For general surgical use dilute to 1%. For instruments 2%. For utensils 5%.

The diffusible and penetrating properties of this preparation were referred to in the 1915 Hunterian Oration by Sir Watson Cheyne, at the Royal College of Surgeons.

The penetration diffusibility is determined by means of **Edmunds' Cell**—an ingenious apparatus employing a slab of Agar culture medium with the Test organism brushed on one side and the antiseptic to be tested on the other. The area of no growth corresponds with diffusibility and penetration of the antiseptic. Diffusol was found superior to foreign made Lysol.

For mucous membranes 0·1% or 10 minims to the pint approx is efficient.

For coughs and throat irritation 20 minims added to 1½ pints of water at 149° F and inhaled, *e.g.*, in a Portable Inhaler.

Phenoloid Tablets.—*Martindale*

These are prepared of two strengths, respectively ⅛ and ¼ grain of "Phenoloid" corresponding in activity to 1 and 2 grains respectively of Carbolic Acid. They are flavoured with Lavender. We examined the efficacy of these Tablets as an antiseptic and prepared "plates" from the saliva before and after sucking a tablet. The diminution of bacteria was remarkable.

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* But see first par. under Acidum Carbolicum.

Uses.—To be slowly dissolved in the mouth in tonsillitis, chronic laryn-gitis, stomatitis, and in dyspepsia, gastritis and diarrhœa.

✱**Hycol** (T.M. 305595, Class 2, also 414679, Class 3). The preparation s said by the makers to be "non-poisonous."

Hycol Medical is also made. *Dose* internally: 1 to 3 minims in cholera. A tar product containing 38% "Phenoloids" (200° to 305°) C.A. Co-efficient on *B. Typhosus* is indicated as 24-26. It is stated to be non-poisonous. It is used in dilution 1 in 10,000, *e.g.*, in blepharitis to as strong as 1 in 5, *e.g.*, in avus and lupus. In diphtheria as spray 1 in 1,000, in gonorrhœa 1 in 1,000 o 1 in 200; to wounds 2 to 5%. In gynæcology 1 in 400.

✱**Izal*** (T.Ms. 171127, 300079, Class 2; 171812, Class 3, and 443285, Class 3) (Medical).

Dose.—15 to 60 minims in ½ to 1 ounce milk or water.

An emulsion containing 45% Izal Oil—a "Coke Oven Oil," used as a non-poisonous disinfectant and antiseptic, 1 in 200 of water. It is stated to ontain Phenoloids. It mixes with all kinds of water whether strongly aline or otherwise.

Capsules of Izal (plain), 2 minims and Izal 2 minims **with Cod Liver Oil** 5 minims are supplied for use in phthisis.

Izal, with Bismuth Subnitrate and Chloromorphine Solution, is useful in ysentery.

In cholera has been tried, but has irritant action on the kidneys.—L. Ganguly, I.M.G., Oct. '25/467.

Izal Fluid containing the same amount of impure Izal Oil is also supplied. Strength of 1 in 400 disinfected *Staphylococcus pyogenes aureus* in pus in 15 minutes—in a simple broth culture 1 in 600 will do the work in 5 minutes.

Ⓟ✱†**Jeyes Fluid Disinfectant** (T.M. 66985, 84764,) Class 3; 42495 1937, 63869, 81826, 81977, 154330, 186844, 204987, 206486, 218513 Class 2) to be distinguished from Cyllin (medical). Contains Cresols with Resin Soap.

Ⓟ✱†**Jeyes Soluble Fluid** (✱**Jeysol.** T.M. 385267, Class 2) differs from he Fluid Disinfectant in mixing clear with water. It contains 50% Cresylic Acid.

✱**Kerol** (T.M. 275140, Class 2, and 469285, Class 3).—Composition not tated, though it is described as containing no Carbolic or Cresylic Acids nd as non-poisonous. It is claimed to be a non-irritant germicide. R. T. Hewlett reported this preparation slightly less toxic than Lysol—*vide* Med. Times, June 27, 1908.

1 in 180 is germicidal to Tubercle Bacilli in three hours even when dried.—V. G. Savage. **Kerol Capsules** are used as intestinal antiseptics.

Ⓟ†✱**Klondol** (T.M. 364070, Class 3, and 364147, Class 2).

Ⓟ†**Kresapol** (Ferris).

Ⓟ†✱**Lycryl** (T.M. 363298, Class 3, and 363297, Class 2). 50% Cresols.

Ⓟ†✱‡**Lysol** (*cf. antea*).

Ⓟ†✱**Microbene** (T.M. 299709, also 321586, Class 2). 50% Cresols.

✱**Monsol** (T.M. 455799, Class 3). Stated to be prepared from new oils btained in the gasification of coal by the Mond Power Gas Process. They esemble the Phenols and have germicidal powers, but are less toxic and ess irritant. It is not marked Poison.

Uses.—As an antiseptic for wounds, Monsol stimulates phagocytosis and promotes granulation. For a dressing a 1 in 200 solution. For douchings, irrigation, etc., use 1 in 500, gradually increasing to 1 in 250; for packings and tampons, and for instruments, use 1 in 20.

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* Makers say not Ⓟ

† But see first par. under Acidum Carbolicum.

‡ Trade Mark 98947 and 98948, removed from Register (avoided) under Patents, Designs and Trade Marks (Temporary Rules) Act, 1914; *cf.* Patents, tc. (Temp. Rules) Act, 1914.

Lysol was the name of an article made according to an expired patent. When a patent expires the name of the patented article becomes public roperty. The name, however, remained on the Trade Mark register until emoved under the Patents, Designs and Trade Marks (Temporary Rules) Act, 1914.—C.D. Feb. 20/15. See also result of Lysol Ltd. *v.* Freesol Co., . 32.

T.M. 406947, Class 3, applies to Marshall's Lysol Hair Wash, and was btained on the device of a label, not on the name Lysol.

Monsol Ointment is used as a bland antiseptic dressing in skin diseases, *e.g.* eczema, erysipelas, and for burns.

Monsol Capsules are prepared for alimentary antisepsis, and the pastilles are stated to be expectorant, demulcent, and stimulating, as well as germicidal.

Monsol Throat Pastilles, according to the makers, contain Rectified Oil of Tar $\frac{1}{15}$ minim, Oil of Aniseed $\frac{1}{8}$ minim, Oil of Orange $\frac{1}{20}$ minim, in a sugar basis.

Ⓟ*✲**Pacolol** (T.M. 328,008, Class 2).

Ⓟ*✲**Pathone** (T.M. 390037, Class 2, and 349594, Class 3).

Ⓟ*✲**Toxol** (T.M. 353560, Class 2, and 363280, Class 3).

Ⓟ*✲**Trikresol** (T.M. 216094 Class 3), a specialty of the three cresols. It is a colourless liquid, slightly soluble in water, said to have three times the germicidal power of Phenol. For surgical use, ½ to 1% solution. As an eye wash 1 in 1,000 or 2,000.

Ⓟ**Trikresol-Formalin.** These substances, in proportion of 4 to 1, form a useful application as a dental dressing

1% Trikresol is an effective solution for rendering the tooth-brush free from the common pathogenic organisms.

Ⓟ*✲**Typhol** (T.M. 315937, Class 3).

For the Lancet and Rideal-Walker methods of standardising Disinfectants B.P.Conf. Discussion and modifications of the methods, see Vol. II.

ACIDUM FORMICUM (P.G. VI.).

Syn. **Aminic Acid.** H.COOH=46·016.

Dose.—2 to 10 minims (**0·12** to **0·6** Cc.) *per os* freely diluted, *e.g.*, with mineral water. Hypodermically 2 to 15 minims of 1 in 1,000 dilution of actual acid, but it is intensely irritating. It is better given as Sodium Salt.

A colourless liquid Sp. Gr. 1·061—1·064 (24 to 25% H.COOH). Miscible with water. In concentrated form has a caustic action.

Note:—Formic Acid is obtainable also of Sp. Gr. 1·12=50%, 1·15 =65%; 1·2=85%; 1·22=100% H.COOH. As a rule the 25% Acid is referred to.

Uses.—It is alleged that this acid (acting in a manner similar to cantharides) gives tone to the muscles and restrains muscular tremor, as in cases of paralysis agitans, and in chorea. It increases muscular energy and abolishes the sense of fatigue. It is employed usually as one of the salts, *e.g.*, in influenza, gout, rheumatism, tremors, etc.

The acid was originally made from the Red Ant, *Formica rufa.* The stinging nettle, *Urtica dioica,* contains formic acid, and has long been employed as a tonic and diuretic.

Succus Urticæ is prepared in strength 1=1.

Dose.—1 to 4 drachms increased if desired. The juice expressed from the fresh plant, preserved with 25% of 90% Alcohol.

Formic Acid is stated to be produced by the growth of *B. rheumaticus* and is a considerable constituent in sweat. *cf. Vol. II.*

Rheumatism, it is said, has been cured by applying bees to joints. Bee-keepers it is said are remarkably free from rheumatism.

As a *food preservative* 0·1 to 0·15% pure Formic Acid suffices. It has been suggested as substitute for Citric, Tartaric and Phosphoric Acids in the Mineral Water trade. 3 ounces of 'Alacet' (60% Acid) for 1 gallon of Lemon Syrup. The taste is equal to Syrup made with Citric Acid.

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* But see first par. under Acidum Carbolicum.

Sodii Formas, H.COONa=68·005.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**) in solution, increased if desired to as much as 60 grains (**4 Gm.**) per diem.

A white alkaline powder soluble in water. A strong reducing agent and powerful antiseptic. *Incompatible with Acids.*

Manufacture.—The Salt should be anhydrous. It can be made by evaporating nearly to dryness on a steam bath and drying at 130° C., or preferably by allowing a solution saturated at 123° C. to cool with constant stirring to 30° C. and drying the crystals at 115° C.—C. H. Hampshire and W. R. Pratt, Y.B.P., 1913,546.

T. Tyrer and F. C. Gosling found 2 H_2O in the crystalline salt.—P.J.ii/12,157.

Uses.—In cases of heart and kidney diseases it is stated to lessen the loss of albumin by the urine, although it has diuretic powers. Does not disagree with the stomach. Said to be non-toxic. Has been employed in phthisis and in pneumonia. Improves appetite, mental and physical activity. Ocular fatigue has been treated with sodium formate instillation 1 in 50 to 1 in 30. Rheumatism has improved by 15 grain doses.

Diphtheria has been treated with 5 to 10 minim doses of 25% solution in water every 4 hours.

Sterules of Sodium Formate contain $\frac{1}{8}$ and $\frac{1}{2}$ grain.

Elixir Sodii Formatis. *Dose.*—2 drachms (**8 Cc.**).

Sodium Formate 4, Vanilla Essence, *q.s.*, Simple Syrup to 100.

Calcii Formas, $(H.COO)_2Ca$=130·086.

Dose.—3 to 5 grains (**0·2 to 0·3 Gm.**).

White crystals soluble 1 in 10 of water. More permanent than the Sodium Salt. For hæmorrhages has been found useful.

Sterules of Calcium Formate contain $\frac{3}{4}$ grain (**0·05 Gm.**).

Ferri Formas. (**Ferric Formate.**)

$Fe_3(OH)_2.(HCOO)_7.4H_2O$=588·656.

Dose.—1½ to 3 grains (**0·1 to 0·2 Gm.**).

Red crystals soluble in water about 1 in 19 at 17° C. but solutions are unstable.

Lithii Formas, H.COOLi, H_2O=69·964. White crystalline powder freely soluble in water.

Dose.—1 to 5 grains (**0·06 to 0·3Gm.**). As much as 1½ Gm. of this salt have been given daily.

Uses.—Similar to the Sodium Salt and has been given in gout.

Magnesii Formas, $Mg.(HCO_2)_2 2H_2O$=150·368.

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**).

Colourless crystals soluble in water.

Potassii Formas, H.COOK=84·104.

Dose and use similar to the Sodium Salt.

Crystalline powder very soluble in water forming neutral solution. Owing to hygroscopic tendency the commercial salt is about 95% pure.

P I **Strychninæ Formas,** $C_{21}H_{22}N_2O_2$. HCOOH=380·208.

Dose.—$\frac{1}{64}$ grain (**0·001 Gm.**).

White crystalline powder, soluble in water about 1 in 3½. A nerve stimulant and muscular tonic. It is best prepared anhydrous by drying at below 85° C.

Ⓟ**Hypodermic Sterules of Strychnine Formate** contain 1/64 grain **(0·001 Gm.)** in 15 minims **(1 Cc.)**.

Ⓟ**Syrupus Formatum Compositus** (*Syn.* **Elixir Formatum Compositum**).

Dose.—1 to 2 drachms **(4 to 8 Cc.)**. One drachm contains Formates of Sodium and Potassium each 2 grains, Calcium 1 grain, Quinine $\frac{1}{5}$ grain, Strychnine $\frac{1}{100}$ grain, Formic Acid 2 minims, Cochineal and Vanillin Solutions each $\frac{1}{5}$ minim, Lemon Oil $\frac{1}{60}$ minim, Alcohol 90%, Water and Syrup in proportion 1, 1, 6 *q.s.* to 1 drachm.

ACIDUM GLYCEROPHOSPHORICUM.

$C_3H_5(OH)_2O.PO.(OH)_2=172·099$.

Dose.—5 to 10 minims **(0·3 to 0·6 Cc.)** of 25% acid.

This dibasic acid forms a colourless, sour liquid, miscible with water and alcohol. It is usually made 25% strength and has Sp. Gr. 1·125. A 50% Acid is also supplied in commerce. It may be prepared by heating Glycerin with two-thirds of its weight of Phosphoric Acid 60%, at not exceeding 105° C.

Numerous patented methods of manufacture are referred to, Vol. I., Edn. XVIII., but they are for the most part unworkable.

Uses of the Glycerophosphates.—The Glycerophosphates are extensively prescribed for all forms of wasting disease and are thought to aid metabolism. The Compound Syrup and Glycerol of Glycerophosphates, the Syrup of Glycerophosphates with Formates, and many of the Milk and Glycerophosphate preparations are credited with tonic properties for use in certain devitalised conditions, *e.g.*, during convalescence from serious illness.

The Glycerophosphates were originally introduced into medicine by Robin, on the grounds that Lecithin (*q.v.*), an omnipresent, complex fatty body, contains its phosphorus in the form of the Glycerophosphoric radical.

A pharmacologist suggests, however, that there is no advantage gained over inorganic by organic phosphates.

For a further consideration of the subject see Edn. XVIII, pp. 41 *and* 42.

For the Chemical Examination of Glycerophosphates and Tests for Purity see Umney and Bennett, P.J. ii./14,134.

Phosphates in glycerophosphates—determination of small quantities by means of Ammonium Molybdate.—J. L. Lizius, P.J. i./21,478.

Calcii Glycerophosphas (Neutral). $C_3H_7O_3.PO_3Ca = 210·153$ or $+H_2O=228·169$, Fr. Cx., P. Belg. P. Helv. and P.G. VI. have $+2\ H_2O$. U.S. X. requires 98% anhydrous salt when dried at 130° C. Ph. Ital. IV. "In commerce with 1 to 2 mols. of water."

Dose.—3 to 10 grains **(0·2 to 0·6 Gm.)** in water or considerably more, *vide infra.* Slipule No. 1 holds 5 grains.

This salt is a white crystalline powder. It is formed, together with choline, on the breaking up of lecithin in the process of digestion.

Soluble in cold (about 1 in 40, but different makers' products vary according to whether the compound is mainly the β modification, which s less soluble than α. The α position is the terminal hydroxyl in Glycerin nd the β the central in combination with Phosphoric Acid). It is only lightly soluble in hot water, soluble also in glycerin, insoluble in alcohol. The pure α salt is soluble 1 in 22.—G. J. W. Ferrey, P.J. ii./26,159.

Uses.—Stated to improve nutrition of the nervous system n all cases where nerve activity is enfeebled. It is useful *per os*, or incontinence of urine. It may also be given hypodermically, 2 to 4 grains daily in water. **Calcium Glycerophosphate Sterules** contain one grain, also 2, 3 and 4 grains.

For deficiency of Calcium in the blood bold doses are required. The oluble Phosphates have power in increasing coagulability of the lood. Severe urticaria has been cured by its use.

Incompatible with soluble Carbonates and Phosphates.

Pulvis Calcii Glycerophosphatis cum Lacte Exsiccato.

Milk and Glycerophosphate.—*Martindale.*

Dose.—One heaped tablespoonful ($\frac{1}{2}$ ounce), mixed with 4 to 5 unces of hot (nearly boiling) water, two or three times daily.

This preparation is intended as a restorative and nutritive. Phosphorus and Nitrogen retention are likely to improve with its use. Has proved of value in the feeble for inducing sleep. It contains 5 grains of Calcium Glycerophosphate in the above dose combined with *all* the solids of fresh milk.

Dried Casein alone is sometimes used for preparations of this kind, but n this case the Milk Fat, Salts and Sugar are eliminated, and Dried Caseins f commerce are not always readily soluble even with added alkali.

* **Vitafer** (T.M. 347470, also 324675 and 333647, Class 3; also 329754 and 334627 (assoc.) and 346425 (assoc.) in Class 42) and * **Cibrola** (T.M. 319735, Class 42) are preparations of this description—the former containing the Glycerophosphates of Lime and Sodium.

Calcii Glycerophosphas Solubilis consists of the Neutral Glycerophosphate with Citric Acid added to render it soluble 1 in 25.

Pilula Glycerophosphatum.

Dose.—One thrice daily after food.

Calcium, Magnesium, Potassium and Sodium Glycerophosphates f each 1 grain.

Mix the Potassium Salt or equivalent of 50 or 75% solution with powdered Liquorice Root $\frac{1}{2}$ grain and place on water bath heated to 130° F., not higher. Remove the heat, stir the mixture occasionally, and when it attains the onsistence of a pill mass add it to the other Glycerophosphates previously riturated with Kaolin $\frac{1}{2}$ grain and beat well into a mass. Supply in a bottle. A pill so prepared disintegrates completely in water at 45° F. in half an hour.

Ferri Glycerophosphas (FERRIC GLYCEROPHOSPHATE).

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**). In yellowish powder ontaining approx. 15% of Iron—slightly soluble in water, or in he more soluble brownish-yellow scales.

Flavoring.—Syl Lavandulæ, Syl Vanillæ, Syl Limonis.

Vinum Ferri Glycerophosphatis contains 1%, with Glycerin 5% in Sherry. **Sterules** contain $\frac{1}{2}$ grain (**0·03 Gm.**).

Ⓟ**Compound Iron Glycerophosphate Capsules.**

Dose.—Once thrice daily after meals.

Iron Glycerophosphate, Beta Naphthol of each 3 grains, Extract of Nux Vomica and Indian Hemp of each ¼ grain, Compound Galbanum Pill 1½ grains.

For anæmic patients in dyspepsia.—G. Rankin, B.M.J. i./15,1036.

Lithii Glycerophosphas $C_3H_7O_3.PO_3Li_2$=183 993.

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**)

White amorphous powder soluble in water.

Magnesii Glycerophosphas. $C_3H_7O_3.PO_3Mg$=194·403.

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**).

A white amorphous powder, soluble in water (1 in 41). May be rendered soluble by addition of Citric Acid.—Umney.

We found 1% of Citric Acid increases the solubility to about 1 in 35, 5% to 1 in 25, 10% to 1 in 20. Glycerophosphoric acid added gives the figures 1 in 33, 1 in 24 and 1 in 18 respectively.

Manganesii Glycerophosphas. $C_3H_7O_3.PO_3Mn$=225·013.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

Is reddish white in colour, only slightly soluble in water.

The relative anæmia which is often associated with cardiac over-strain may well be treated by administering Manganese Glycerophosphate with Hæmoglobin.

Potassii Glycerophosphas. $C_3H_7O_3.PO_3K_2 + 3H_2O$ = 302·323.

Dose.—3 to 8 grains (**0·2 to 0·5 Gm.**); hypodermically 3 to 5 grains (**0·2 to 0·3 Gm.**).

A yellowish liquid in 50 and 75% solutions and 100% (solid).

Quininæ Glycerophosphas. *Syn.* KINEURINE.

Dose.—3 to 8 grains (**0·2 to 0·5 Gm.**).

$C_3H_7O_3.H_2PO_3.(C_{20}H_{24}N_2O_2)_2.4H_2O$=892·579. FR. CX. has the compound with $5H_2O$, termed 'basic' quinine glycerophosphate in France. A white powder, soluble in alcohol, but only very slightly in water. **Sterules** contain ½ grain (**0·03 Gm.**).

Sodii Glycerophosphas.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**), *per os*; also given hypodermically in 3 to 5 grain doses.

It is supplied commercially in the following forms:—

Dry Pieces or Powder 100% $C_3H_7O_3.PO_3Na_2.3H_2O$=270·125. Very soluble in water. Hygroscopic. **Solution** 75%, a translucent straw-coloured mass which cannot be poured without warming. **Solution** 50%, syrupy fluid convenient for dispensing.

Glycéro-phosphate de Sodium Cristallisé. FR. CX. SUPP. NOUV., 1926. Is the hydrated di-Sodium Salt of β-glycerophosphoric Acid with 5 mols. H_2O. It contains 70·6% anhydrous salt and 29·4% water. Ph. Ned. V. has $5\frac{1}{2}H_2O$.

Sterules of Sodium Glycerophosphate contain 3 grains (**0·2 Gm.**). Also $\boxed{\mathbb{P}1}$ Sodium Glycerophosphate 1½ grains with Strychnine Cacodylate $\frac{1}{64}$ grain and $\boxed{\mathbb{P}1}$ with $\frac{1}{20}$ grain.

Uses.—In nervous affections, facial neuralgia, Addison's disease lumbago, phosphaturia, anæmia and general debility.

✱**Glycolactophos** (T.M. 344300, Class 42), ✱**Sanaphos** (T.M. 363457 Class 3, and 363458, Class 42), ✱**Sanatogen**, ✱**Sanagen** (T.M. 370293, Class 3, and 364196, Class 42), ✱**Valkasa** (T.M. 329712, Class 42), and ✱**Visem** (T.M. 334359, Class 3, and 336808, Class 42), are Casein and Glycerophosphate ombinations used in neurasthenia, and enfeebled nervous conditions generally. Further details are available, Edn. XVIII., p. 45.

Note. ✻ **Sanatogen,** T.M. 335408 and ✻ The Sanatogen Co. T.M. 335407 nd ✻ Sanatogen Wulfing T.M. 316530 are on the Register, 1928.

trontii Glycerophosphas. $C_3H_7O_3.PO_3Sr=257{\cdot}713$.

Dose.—3 to 8 grains (**0·2 to 0·5 Gm.**).

White powder only slightly soluble in water.

May be prepared from the Sodium Salt by double decomposition with trontium Bromide.

P1 Strychninæ Glycerophosphas.

Dose.—$\frac{1}{64}$ to $\frac{1}{20}$ gr. (**0·001 to 0·003 Gm.**)

White crystalline powder, soluble in water. A 'tonic.'

onfectio Glycerophosphatum Composita. *Martindale.*

Dose.—1 to 2 drachms (**4 to 8 Cc.**).

Calcium glycerophosphate 2½, Iron glycerophosphate 2, Sodium lycerophosphate 2½, Lecithin ½, Citric Acid 1½, Glyl Anisi 12, Pepsin ½, Full Cream Dried Milk to 120.

This preparation has restorative, nutritive and digestive properties.

onfectio Glycerophosphatum cum Malto. *Martindale.*

Dose.—1 to 2 drachms (**4 to 8 Cc.**).

Contains the glycerophosphates as in the last mentioned in a asis of Malt Extract. It does not contain Pepsin.

lixir Glycerophosphatum.

Calcium and Sodium Glycerophosphates of each 2, Iron Glycerohosphate 1, Aromatic Syrup 250. *Dose.*—1 to 4 drachms.

Ⓟ Glycerinum Glycerophosphatum Compositum.—*Syn.* GLYCEROLE OF GLYCEROPHOSPHATES. *Dose.*—1 to 2 drachms (**4 to 8 Cc.**).

Cudbear ¼ ounce, Water 10 ounces. Boil 10 minutes, strain, nd dissolve in the warm liquor—Calcium Glycerophosphate 160 rains, Potassium, Sodium, and Magnesium Glycerophosphates of ach 80 grains, Iron Glycerophosphate 40 grains, Citric Acid 30 rains; add Tincture of Kola 10 drachms, Tincture of Ignatia mara 1 ounce, and Glycerin *q.s.* to 1 pint. This is more palatable han if made with Strychnine and Caffeine. It keeps well, is suitble for export, and for patients who may not take sugar.

lycerinum Glycerophosphatum cum Medulla Rubra. GLYCEROLE OF GLYCEROPHOSPHATES WITH RED BONE MARROW.

Dose.—1 to 2 drachms (**4 to 8 Cc.**).

Dissolve Calcium Glycerophosphate 80 grains, Iron Glycerophosphate) grains, Magnesium Glycerophosphate 40 grains, Manganese Glycerophosate 20 grains, Potassium Glycerophosphate 40 grains, Sodium Glyceroosphate 40 grains, and Citric Acid 15 grains in Distilled Water 10 ounces; en filter and add Chloroform 5 minims, Alcohol (90%) 40 minims, Orangeower Water 1 drachm, Cherry Laurel Water 1½ drachms, Glycerin Extract Red Bone Marrow 10 ounces. Given in rickets and debility.

The writer prepares this Glycerol with four times the amount of Chlororm, *i.e.*, 1 in 480.

ranular Effervescent Glycerophosphates.

Dose.—60 grains (**4 Gm.**).

Contains in 1 drachm, Glycerophosphate of Calcium 3 grains, Iron 1 grain, of Magnesium 3 grains, of Potassium 3 grains, with affeine Citrate 1 grain. A palatable mode of administration.

Malted Glycerophosphates.

Dose.—1 to 4 drachms (4 to 15 Cc.).

Sodium Glycerophosphate 1, Potassium Glycerophosphate 1, dissolved in Water 30, with Liquid Extract of Malt to 120.

Ⓟ**Syrupus Glycerophosphatum Compositus,** B.P.C.

Dose.—1 to 2 fluid drachms (4 to 8 Cc.). 1 drachm contains 1/80 grain Strychnine with Calcium Glycerophosphate $1\frac{1}{4}$ grains, Potassium, Sodium and Magnesium Glycerophosphates of each $\frac{5}{8}$ grain, Iron Glycerophosphate and Caffeine each $\frac{5}{16}$ grain—with Glycerophosphoric Acid and Cudbear (*q.v.*, Vol. II.), to colour.

Ⓟ**Capsules** are prepared equivalent to $\frac{1}{2}$ and 1 drachm.

Ⓟ**Pulvis Glycerophosphatum Compositus.**

Dose.—1 to 2 drachms (4 to 8 Gm.).

Glycerophosphates of Calcium 2·0, Potassium (100%) 1·0, Sodium 1·0, Magnesium 1·0, Iron 0·5, Caffeine 0·5, Strychnine Hydrochloride 0·024 (use Trituration 0·24), Powdered Sugar to 100. This keeps satisfactorily in corked bottles.

Compound Glycerophosphate Tablets are prepared containing in each the same quantities as the Syrup per drachm but without strychnine. To be crushed and taken in a little warm water.

Ⓟ**Syrupus** (*Syn.* **Elixir**) **Glycerophosphatum cum Formatibus** (*Martindale*). Contains Sodium and Potassium Formates of each 5 grains added to each drachm of a compound Glycerophosphate Syrup (made with Acetic Acid).

Ⓟ**Syrupus Glycerophosphatum** (*Robin*) **is a special preparation.**

Dose.—1 to 4 drachms (4 to 15 Cc.).

The published formula (vide Edn. XVIII, p. 47) is impracticable.

Emulsio Olei Morrhuæ et Glycerophosphatum.

Dose.—2 to 8 drachms (8 to 30 Cc.).

Contains the Glycerophosphates of Calcium, Iron, Magnesium, Potassium and Sodium, combined with Cod Liver Oil Emulsion, containing 50% Cod Liver Oil. A useful nutrient combination.

∗**Jecovol** (T.M. 315237 and 318395, Class 3) is a proprietary Emulsion of Cod Liver Oil with Sodium, Calcium and Iron Glycerophosphates.

[P1] **Sérum Névrosthénique Ampoules** (*Fraisse*) contain 0·1 Gm. Sodium Glycerophosphate and 0·0005 Gm. Strychnine Cacodylate, for hypodermic injection. In neurasthenia and other nervous affections.

[P1] *Drops* are also prepared for use by the mouth, containing the above quantities in 25 minims.

Dose.—25 drops daily.

[P1] **Sérum Ferruginous Ampoules** (*Fraisse*) contain Iron Cacodylate 0·01 Gm. ($\frac{1}{6}$ grain), Sodium Glycerophosphate 0·1 Gm. ($1\frac{1}{2}$ grains) and Strychnine Cacodylate 0·0005 Gm. ($\frac{1}{120}$ grain) in 1 Cc.

[P1] *Drops* containing the above quantities in 25 minims are prepared.

Dose.—8 to 10 drops in water after food twice a day (for adults). Maximum daily dose 25 drops,

ACIDUM HYDRIODICUM (*B.P.* '14).

Syn. **Acidum Hydriodicum Dilutum, U.S.**

Dose.—5 to 10 minims (0·3 to 0·6 Cc.) in syrup.

This Acid is readily prepared by heating red phosphorus and iodine in presence of water.

A colourless, sour liquid, which becomes dark in colour on exposure to light. If this happens on keeping shake with a little lute Hypophosphorous Acid (*B.P.* '14 contains 1% added). Sp. Gr. 085=about 12% of Hydrogen Iodide HI=127·940. (*B.P.* '14 ıd U.S. contain 10%). Commercially it is also prepared 20% ith Sp. Gr. 1·17, and 46 to 47% strength with Sp. Gr. 1·5.

Flavoring.—Syl Rosæ, Syl Origani; Syrupus Tolutanus, yrupus Zingiberis.

rrupus Acidi Hydriodici (*B.P.* '14).

Dose.—30 to 60 minims (well diluted).

Diluted Hydriodic Acid 1 by wt., Water 0·5, Syrup to 10. Conins 1% HI. U.S. is similar, containing 1·4%.

lycerinum Acid Hydriodici.

Dose.—20 to 60 minims in Water, increased to three drachms.

Experiments which we have conducted show that dilute Hydrioic Acid 1, Glycerin 4½, and Water 4½, produce a glycerole with ood keeping qualities. Contains 1% hydriodic acid.

ACIDUM HYDROBROMICUM.

HBr=80·924.

cidum Hydrobromicum Concentratum.

Hydrobromic Acid of Sp. Gr. 1·308=35%, colourless or strawloured, when diluted; one volume with three of distilled water roduces an acid of 10% strength. Should be kept from sunlight. of Sp. Gr. 1·260=30%; 1·375=40%; 1·450=45%. Ph. Ned. V. 4 × N. (about 32%).

Incompatible as Acid Hydrochloricum, *q.v.*

cidum Hydrobromicum Dilutum (*B.P.* '14); U.S. IX., Fr. Cx.

Dose.—15 to 60 minims (1 to 4 Cc.); 60 minims=10 grains of otassium bromide approximately. Contains 10% of hydrogen romide. Sp. Gr. 1·077. May be prepared by the action of Phoshoric Acid on Potassium Bromide. A colourless, very sour liquid, ithout odour.

Uses.—To allay nervous excitability and exhaustion, as a solvent r quinine and preventing quinism, and as an alternative for potasum bromide is less liable to cause acne; 8 minims will dissolve 5 ains of quinine sulphate in water, given with morphine to allay after fects. Obviates the sense of fulness of the head felt when taking on for anæmia; also removes effects of excess of tea or alcohol; and calm excited heart. It is useful for tinnitus aurium and tickling cking cough at night, in doses of 10 minims or more, and in headhe, with flushing in the face and ringing in the ears. In vertigo is successful and it relieves toothache. In epilepsy, up to ½ ounce ell diluted may be given; even to 3 ounces daily.

'Bon Voyage,' a specialty for **sea sickness**, of some service, conins, *inter alia*, this acid and sodium bromide.—B.M.J. ii./09, 1818

Dose.—Half an ounce in a wineglassful of water at 6 and 3 hours before embarking, and once a day in half doses for the first two days of the voyage if required. Not to be taken on an empty stomach.

Bon Voyage Tablets are also prepared, 2 being equivalent to ½ ounce dose.

ACIDUM HYDROCHLORICUM.

HCl=36·465.

"*Poisonous—Not to be taken.*"

For retail in Great Britain, Northern Ireland and Irish Free State the box, bottle, vessel, wrapper, or cover in which the acid is containe must be distinctly labelled with (1) *the* **name of the substance** ; (2) *th words* "**Poisonous—not to be taken**"; (3) *the* **name and addres** *of the seller. Any liquid substance to which Section 5 of the Poison and Pharmacy Act,* 1908,—*Restrictions on sale of certain Poisono Substances—applies (to wit, Hydrochloric, Nitric and Sulphuric Acids Soluble Salts of Oxalic Acid, Liquid preparations containing mor than 5% by weight of free Ammonia, and all liquid preparations sol as Carbolic, etc., containing not more than 3% Phenols,—see Poison Schedule), shall not be delivered except in bottles or other containers rendered* **distinguishable by touch** *from ordinary bottles or containers.*

B.P. '14 has Sp. Gr. 1·160. Contains 31·79% by weight HCl Ph. Ned. V. and P. Helv. 25%. Fr. Cx. 33·65%. P.G. VI 24·8 to 25·2%. Ph. Ital. IV. 37·39%. U.S. X. 31—33%.

Antidotes.—Alkalis, sal volatile, saccharated lime, calcium carbonate, alkaline bicarbonates, carron oil, white of egg, morphine, lim water, magnesia, milk, soap and water. Give beef tea enema an stimulants.

Suggestions to add mineral acids and Salts of Lemon to Poisons Schedul—H. R. Oswald, West London Coroner, B.M.J. ii./25,1020,1033.

Incompatible with alkalis, alkaline carbonates, metali oxides, silver and lead salts.

Use.—Escharotic.

Alimentary Toxæmia.—Bouchard's Remedy: fuming hydrochloric aci 5 to 10 m. freshly mixed at the time of administration with 6 to 8 ounces water and taken with every meal. Of great value—reinforces the antisepti power of the gastric juice.—W Armstrong, L. i./13,1384.

Neuritis treated by applying strong Hydrochloric Acid to the skin alon the line of the inflamed and painful nerve on a wad of cotton wool. Result striking and appreciated (H. Wingfield's treatment).—H. Sainsbury, L. i./1 911. The treatment was described 20 years ago. It was discovered acc dentally. R. A. Bayliss reported cases successfully treated.—L. ii./17,5

Hydrochloric Acid, arsenic-free, may be made by warmin with pure fine copper gauze, and then distilling.

Acidum Hydrochloricum Dilutum (*B.P.* '14).

Dose.—5 to 20 minims (0·3 to 1·2 Cc.).

Is prepared by diluting 28·44 by vol. of the strong acid with wate to 100. Sp. Gr. 1·048. Contains *B.P.* '14 U.S., P. Helv. and Norsk, 10% HCl by weight. Ph. Ital. IV. 7·07%, Ph. Ned. V. 4 × N. (14·5%), P.G. VI. 12·4 to 12·6%.

Use.—Tonic biliary stimulant. In dyspepsia, where insufficien of acid. In pernicious anæmia strong Hydrochloric Acid 10 to 15 drops given in mucilage has been found useful. (M.A. 1911, 149.) Gargle 1 in 50 to 1 in 100 for sore throat. When diluted forms a useful refrigerant drink and lotion.

In dilatation of the stomach 10 to 15 minims after each meal may be given with or without 6 to 8 grains of Pepsin.

RHEUMATOID ARTHRITIS—Relation of gastric secretion to. It is often associated with some focus of pyogenic infection,—*e.g.*, frequently oral sepsis. In nine cases there was indication of chemical changes in the gastric secretion (*a*) diminution in the amount of free Hydrochloric Acid and also the active Hydrochloric Acid, (*b*) an excess of Mineral Chlorides pointing to a process of neutralisation, and (*c*) a comparatively low ratio between the active HCl and the Mineral Chlorides. An acid mixture containing Dilute Hydrochloric Acid 5 minims, Glycerol of Pepsin 20 minims, Clove Oil 1 minim, Tincture of Quillaia 20 minims, Aniseed Water to ½ oz. *Dose*—thrice daily. Cases benefited.—A. S. Woodwark and R. L. MacKenzie Wallis.—L. ii./12, 943.

The regulation of the alkaline balance of the blood, and through it of the tissue fluids, is one of the most important functions of the kidneys. Treatment with Hydrochloric Acid largely regulates the amount and character of the urine excreted by its action on the renal tissue. Where acid is being administered in doubtful cases the blood pressure should always be observed to avoid overdose.—J. Campbell McClure and H. A. Ellis, L. ii./21,271.

RICKETS treated with Hydrochloric Acid.—B.M.J.E. i./24,69.

*Oxyntin (T.M. 274899). *Dose.*—5 to 15 grains (**0·3 to 1 Gm.**).

An Albumin-Hydrochloric Acid compound. Contains 5% by weight of Hydrochloric Acid (HCl). Ten grains are equivalent to 5 minims of Dilute Hydrochloric Acid, instead of which it may be prescribed.

Given in gastric disorders to increase HCl content.—B.M.J. i./15,807.

Acidin.—*Dose.*—5 to 15 grains (**0·3 to 1 Gm.**), equivalent to 2½ to 7½ minims of Dilute Hydrochloric Acid (B.P. '14), in cachet or powder, followed by a draught of water.

A protein compound containing 5% Hydrochloric Acid, soluble in water. Useful for liberation of acid in a nascent condition as digestive.

An investigation into the value of Pepsin and Hydrochloric Acid in achlorhydria showed that a proper concentration of free Hydrochloric Acid seemed to be the primary consideration in gastric secretion.—H. V. Dobson, Jl. Ph. and Exp. Ther., Apl. '27, 447.

ACIDUM HYDROCYANICUM.

Prussic Acid (SCHEELE'S STRENGTH).

P1 *Prussic Acid and all preparations or admixtures containing* 0·1 *or more* % *of Prussic Acid* (i.e., *Hydrogen Cyanide*), e.g., *Aqua Laurocerasi, q.v.*

Applicable to Northern Ireland as above and in respect of Irish Free State "Prussic Acid" only.

Ⓟ *All preparations or admixtures containing less than* 0·1% *Prussic Acid* (*Hydrogen Cyanide intended*).

Manufactured by distillation of Potassium Ferrocyanide with dilute Sulphuric Acid.

Dose.—1 to 3 minims (**0·06 to 0·2 Cc.**)

Colourless liquid with powerful odour Sp. Gr. 0·994 Contains 4% HCN=27·016.

Antidotes.—Emetics immediately, stomach tube, brandy, or ether, fresh air, inhaling ammonia, artificial respiration (20 per minute). $\frac{1}{50}$ grain atropine hypodermically. Hydrogen Peroxide and Chlorine Water have been given.

Dissolve about 15 grains of Ferrous Sulphate and about 20 minims of Tincture (or Solution) of Ferric Chloride in a wineglassful of water, then add 1 to 2 drachms of Magnesium Carbonate, previously made into a thin cream with water. Mix and give and repeat *s.o.s.* These quantities are equivalent to about 100 minims of Dilute Hydrocyanic Acid, B.P.—St. Bart.'s H.

50 to 70 Cc. of a 20% Sodium Thiosulphate solution intravenously should be tried. A case where life was saved.—B.M.J. i./25,1158.

Two intravenous injections of Sodium Thiosulphate, using 10 Cc. of a 30% solution, of use in a case of Potassium Cyanide poisoning.—Pres., July, '27,256.

P1 Acidum Hydrocyanicum Dilutum (*B.P.* '14), U.S. IX., PH. NED., P. BELG. FR. CX. (previously 1% only). *Syn.* DILUTE PRUSSIC ACID.

Dose.—2 to 5 minims (0·12 to 0·3 Cc.). FR. CX.—Max. single dose 1½ minims (0·1 Gm.); Max. during 24 hours 8 minims (0·5 Gm.).

Contains 2% HCN, Sp. Gr. 0·997. F.I. 1925 no longer recognises this acid. Keep in inverted stoppered bottles in the dark.

For the estimation of Hydrocyanic Acid and detection of minute amounts in Toxicological work, see Vol. II.

Flavoring.—Glyl Lavandulæ, Glyl Menthæ Piperitæ; Spiritus Menthæ Piperitæ; Syrupus Zingiberis.

Incompatible with soluble silver, mercury and iron salts.

Uses.—In dyspepsia with pain, combined with bismuth or sodium bicarbonate. To allay vomiting and cough. It is very useful as a sedative in an effervescing mixture, and as a 2% dilution as lotion to soothe the itching of pruritus ani or pruritus vulvæ, or general prurigo. Must not be used to broken skin surface.

To promote healing of acute gastric ulcer bismuth, according to some, is of no particular value, but dilute hydrocyanic acid 5 minims in two drachms water is useful for vomiting.

Ⓟ Lotio Acidi Hydrocyanici cum Sodio, L.H.

Diluted Hydrocyanic Acid 8·3, Borax 9·2, Sodium Bicarbonate 9·2, Water to 1000. As a soothing eye lotion.—**R.O.H.** has 1% of each.

ACIDUM HYPOCHLOROSUM.

$HClO = 52{\cdot}465.$

Hypochlorous Acid, as such, has not been isolated. In solution and especially in the form of its salts—the Hypochlorites, *e.g.* those of Calcium and Sodium, it has played an important part in many chemical processes. The method of treating Chloride of Lime with Boric Acid in excess, as advocated during the war, was recognised in the past as a method of making solutions of Hypochlorous Acid.

The acid in dilute solution is practically colourless; in a concentrated form it is yellowish. It readily undergoes decomposition with formation of chlorine, chloric acid, oxygen and water. It is hence a strong oxidising agent and for this reason a bleaching agent.

Medicinally the Chlorinated Soda Solution was a popular detergent during the last half century, but has latterly fallen into desuetude.

The Hypochlorites were, however, resuscitated and were extensively employed for wound treatment in the war as described in the following pages.

Calx Chlorinata (*B.P.* '14). SEL DE JAVELLE. A dull white powder having about 30% available Chlorine. Solutions of 0·25 to 0·5% applied to burns and ulcers heal them rapidly.

25,000 gallons of water can be sterilised for less than 1d. by aid of Calx Chlorinata.—Thresh.

Danger of explosion of Bleaching Powder in drums owing to evolution of Oxygen.—Y.B.P., '24, 152.

Water sterilisation with Calcium Hypochlorite for troops on active service.—Sims Woodhead, B.M.J. ii./14,494.

Chlorination of Potable Water. 1 ounce of Chloride of Lime to 2,000 gallons. Remove taste by a few crystals of Sodium Hyposulphite.—Ministry of Health Circular, L. ii./21,671. *cf.* also Vol. ii.

Liquor Calcis Chlorinatæ (*B.P.* '14). 10%. Contains not less than 2% available Chlorine, 3% when freshly made.

Unguentum Calcis Chlorinatæ.

Chilblains can be cured with 10% strength in Paraffin Ointment.

Gonococcal arthritis in women has been treated by vaginal douching twice daily with solution of calx chlorinata 1 in 100. Afterwards a solution of Hydrogen Peroxide is freely used.

Phthisical sufferers advised to work at bleaching powder factories. Interesting data concerning Chlorine and Nitric Peroxide fumes.—T. Aitchison, B.M.J. ii./15,489.

Liquor Sodæ Chlorinatæ (*B.P.* '14). 2·5% Cl. *Dose.*—10 to 20 minims. Dissolve Sodium Carbonate 600 in Water 1,000. Triturate Chlorinated Lime 400, with Water 3,000. Mix, and filter. *Should be freshly made.* Other Pharmacopœias use more Sodium Carbonate to obtain a preparation which will keep better.

The reaction may be represented as follows:—

$$CaOCl_2 + Na_2CO_3 = NaClO + NaCl + CaCO_3.$$

The quantity of Sodium Carbonate in B.P. '14 method is not enough to precipitate all the dissolved Calcium Hydroxide and if sufficiency is used the preparation is excessively alkaline. R. C. Cowley modifies the formula.—C.D. 1919, 91, 49, abst. Y.B.P. 1919, 280.

Carefully distinguish from Liquor Sodæ Chlorinatæ Chirurgicalis, U.S. X. p. 50.

Uses.—As a wound lotion and for general antiseptic purposes; for infected wounds or ulcers. It is usually employed diluted with 15 to 60 times its volume of water or normal saline. Thus diluted it has been used as a vaginal douche and as an irrigant of the bladder, and mouth wash. Locally in skin affections, however, a 10 to 30% dilution is suitable.

It is strongly alkaline and may well be treated with Boric Acid. (*cf.* Dakin's Solution.)

EAU DE LABARRAQUE OR LIQUEUR DE LABARRAQUE.

As made according to the French Codex, this is about ¼ the strength of Liquor Sodæ Chlorinatæ (*B.P.* '14). Much confusion has arisen over this Labarraque's Solution from several aspects. The U.S.P. X., for example, gives Eau de Labarraque as a synonym for

Liquor Sodæ Chlorinatæ—the strong preparation containing 2·5% available Chlorine.

Initially Labarraque made his bleaching solution by passing Chlorine into Sodium Carbonate Solution. In this case free Hypochlorous Acid is present:

$$Na_2CO_3 + 4Cl + H_2O = 2HClO + 2NaCl + CO_2.$$

Eau de Javelle (first made in 1789) was originally a solution of Chlorinated Potash made with Potassium Carbonate on the same lines as Chlorinated Soda Solution, but it is now replaced in great measure by the Soda Compound.

Liquor Potassii et Sodii Hypochloritum (Becker). Potassium Hydroxide 5, Sodium Hydroxide 4, Water to 1,000. Dissolve and pass Chlorine *q.s.* into the solution to saturate.

Inoperable cancer has been treated by injections of 1½ to 2 Cc. under the skin daily for varying periods over deltoid muscle, or over the great trochanter, avoiding the growth and neighbouring skin. Platinum needle is used.

It has been found preferable to make this *half strength.* **Sterules** 3 Cc. of this strength are made.

For carbuncles Liquor Sodæ Chlorinatæ, diluted 1 in 20 or 1 in 30, is a non-irritant and powerful dressing.—S. Phillips, L. i./21,63.

Liquor Acidi Hypochlorosi Compositus. *Syn.* Eusol.—(Lorrain Smith, Drennan, Rettie & Campbell.—B.M.J. ii./15,129).

This solution contains approximately 0·27% Hypochlorous Acid, together with small amounts of Calcium Biborate and Calcium Chloride.

The solution is slightly alkaline to test paper.

Manufacture.—Take Bleaching Powder 12·5 (of recent preparation and which has not been allowed to get wet), and Tap Water 1,000. Triturate thoroughly with enough of the water to make a paste and dilute with the remainder. Add Powdered Boric Acid 12·5 and shake well. Allow to stand for two or three hours and filter through cloth or paper. Eupad 25 may be used instead of the two ingredients. The interaction according to the originators may be represented by the following:—

$$2CaOCl_2 + 2H_3BO_3 = 2HClO + CaB_2O_4 + CaCl_2 + 2H_2O.$$

It is to be noted that only *half* the 'available' chlorine (as determined in an assay) is liberated as Hypochlorous Acid, the available Chlorine from $2CaOCl_2$ being 4Cl.

The two powders may conveniently be packed separately ready weighed for use sufficient to make 1 or 2 or 5 litres, for purposes of transit—the chlorinated lime in waxed paper (*cf.* L. i./16,32).

For Details of Preservation, Assay and Bactericidal Power, see Vol. II.

Uses.—In general, Eusol may be employed as (*a*) a lotion; (*b*) a fomentation with waterproof cover; (*c*) on gauze wrung out and applied without waterproof; or (*d*) as a bath full strength or diluted. The object is to secure the maximum effect with minimum irritation. As a lotion it should in preference be applied *warm*, for example by standing the bottle in a basin of hot water.

Although solutions of Alkaline Hypochlorites have been used for many years, solutions of the acid have not been generally employed. Chlorine water probably owes its antiseptic power to the presence of this acid. Lister found the Liquor Chlori of the old B.P. effective when a 1 in 5 solution of Phenol had failed (1870).

Eusol has been much used to wounds. It is the outcome of an investigation at the Royal Infirmary, Edinburgh, to prepare an antiseptic which could be applied as a first dressing in the field to prevent sepsis. It has no harmful effect upon the tissues, the effect being purely local. Flow of lymph is induced by it from the tissues. Its most marked property is the removal of offensive odour in the wound. For field use the practical advantages are that the antiseptic may be used as such or in the form of dry powder (Eupad) if water is not available—*vide* Eupad.

References to Eusol in civilian cases.

The authors of the original communication state that the solution was used in the customary out-patient cases—injuries to the head or hands, lacerated, contused or incised, many being septic. It was employed as a lotion, a 'soak' covered with waterproof or as a dry dressing (gauze wrung out of the solution and then applied with the usual wool or bandage covering). Septic cases were clean in 1 to 3 days, while Boric Acid soaks conducted as control required 4 to 6 days.

In clean injuries it had about the same effect as Iodine, but produced less smarting.

In mastoid operations and in cases of cerebellar abscesses the use of the solution was most encouraging, also as a douche in maternity cases and in cystitis, for treatment of ulcers of the leg, gangrene of the feet, pyorrhœa alveolaris and follicular tonsillitis. There is no danger of absorption. There was no indication of deleterious effect even on devitalised tissue. In a wound superficial bleaching may occur and with some irritation. If pain is produced, it is a sign that the application is too strong, and it is to be diluted with normal saline. All the above notes refer to the undiluted preparation.

The solution combines a hypertonising effect with its antiseptic action.

Tested by the **Edmunds' Cell** method, Sir W. Watson Cheyne found that Eusol did not effect any marked inhibitory action by diffusion. Eupad, however, diffuses widely in agar plates. It is possible it would be a useful agent in delaying infection in the first instance.—L. ii./15,672.

Its effect is sometimes magical. Eusol is seldom painful, and a good routine application, but some skins are very susceptible to it. *It must not be applied for long periods to wounds of the back of the hand, dorsum of foot and of the neck, forearm and wrist.* In general it should be applied once or exceptionally twice daily and *should not be covered by protective.* It should be freshly made. The drip method is specially useful in compound fractures, and in all lacerated wounds of the limbs where there is gas gangrene and foul smelling sores. It need not be continued after the wound is fairly clean and free from smell. A sterile dressing is then sufficient.—A. Don, B.M.J. i./16,648.

Varicose ulcer, carcinoma of rectum (operation), lacerated wounds (results of accidents), severe burns, cystitis (1 in 8 irrigation), tuberculous periostitis with abscess and ulceration, tuberculous arthritis of knee (sinus), hydatid cyst (douche with 2 pints half strength), septic cellulitis, tuberculous osteomyelitis, necrosis of lower jaw for 6 months, tuberculous hip joint (amputation through joint), acute suppurative appendicitis (syringe and soak half strength), acute streptococcic infection of thumb, epithelioma of neck, tuberculous empyema, gonorrhœal discharge (burning pain at first on injection—1 in 5—but decreased as discharge lessened and finally stopped in 5 days), tuberculous otitis media, tonsillectomy (sprayed)—were amongst 99 civil cases reported by the Medical Research Committee in which Eusol and Eupad were successfully used.

Liquor Calcis Chlorinatæ (a 10% solution) may also be used to make **Eusol.** Dilute 135 Cc. of the B.P. Liquor to 1 litre, add Boric Acid 10 Gm., and shake to dissolve. The Boric Acid may be kept in saturated solution (4%). 250 Cc. will be required to make the litre of Eusol. Dilute the Liquor Calcis Chlorinatæ to 750 Cc. and add the 250 Cc. Boric Acid solution. Liquor Calcis Chlorinatæ keeps well. These quantities are based on a chlorinated lime assaying 25% available chlorine, which is about an average. If Bleaching Powder of high quality is used, 125 Cc. of the solution will be sufficient.

Intravenous Injection—in septicæmia. Dilute the 135 Cc. of Chlorinated Lime Solution to 500 Cc., add the Boric Acid Solution, and finally

Sodium Chloride 8·5 Gm. in Water 250 Cc.—Prof. Lorrain Smith and co-workers, B.M.J. ii./17,386. Malignant endocarditis with pneumonia treated by 80 to 120 Cc., without harm—*ibid.* Malaria treated.—L. i./20,1095.

Acute toxæmia secondary to gas gangrene treated by Hypochlorous Acid solution (Eusol to which 0·85% Sodium Chloride was added) intravenously. 40 Cc. to 70 Cc. doses by means of a Record syringe into the median basilic vein. In one case 70 Cc. Recoveries in three cases very gratifying.—J. Fraser and H. J. Bates, B.M.J. i./16,83.

Further cases with recoveries.—B.M.J. ii./16,173.

Its feeble alkalinity (due to calcium biborate) renders it safe for introducing into wounds and serous cavities. In lacerated and contused wounds it is the most efficient antiseptic we possess. A solution of pure hypochlorous acid (*i.e.*, without the calcium biborate) cannot be injected intravenously as it coagulates the blood, nor can a dilute Sodium Hypochlorite solution, as it causes hæmolysis. The rate of injection (10 Cc. per minute) is an important point.—B.M.J. i./16,171,175.

A two-way canula fitted with a stopcock is useful—attached to the 20 Cc. Record syringe. Saline from the syringe is first injected, then the Eusol (warmed to body temperature) is drawn up from a flask. As much as 150 Cc. may be given. Care must be taken not to inject Eusol into the tissues, as even a few drops cause severe pain.—J. A. Graham, B.M.J. i./16,632.

Direct germicidal effects cannot be ascribed in these circumstances. The action, it is thought, depends on formation of Chloramines.—B.M.J. i./16,852.

Generalised sepsis. Two cases of septic otitic thrombosis of the sigmoid sinus. 60 Cc. intravenously with the same quantity of lukewarm saline. Successful.—J. S. Fraser and A. Campbell, B.M.J i./17,357.

Cordova's Modified Eusol. For details see Edn. XVIII., p. 56.

Eupad. **Pulvis Calcis Chlorinatæ et Acidi Borici.**

(Lorrain Smith and co-workers, B.M.J. ii./15,129.)

Mix intimately equal weights of finely ground Bleaching Powder (dry) and powdered Boric Acid.

Preservation.—Should be kept in closely stoppered bottles and not exposed to the light more than necessary—indeed, it would be preferable to mix it quite freshly for use, as there is much loss of Hypochlorous Acid on keeping, owing to the inherent moisture always present in Chlorinated Lime.

Caution. The evolution of Chlorinated vapour in mixing the ingredients is quite sufficient to "gas" the unwary.

Strength.—Employing Bleaching Powder of the *B.P.* '14 strength, this preparation contains 15% available Chlorine or 11% approx. of Hypochlorous Acid.

Uses.—This antiseptic dressing was advocated as a dry dressing to wounds during the war. It evolves Hypochlorous Acid.

The gas evolved acts more energetically than that contained in Eusol, and it is liberated more rapidly when moistened between layers of gauze or lint (as in the pad of a first field dressing), and covered with wool and a bandage.

When applied as above but covered with waterproof it should be used for a short time only—10 to 15 minutes as a rule. If it causes pain a weaker application is indicated. The irritation, however, generally affects the skin surrounding a wound.

1 to 2 Gm. is the quantity mentioned as suitable for use in the first field dressing.

Pulvis Calcis Chlorinatæ et Acidi Borici Mitis. *Syn.* **"Kepad."** —*Martindale.*

Chlorinated Lime 1, Boric Acid in fine powder 9½, Kieselguhr (sterilised) 9½ (*i.e.*, 5% Chlorinated Lime).

Eupad was found to be irritating. This preparation ($\frac{1}{10}$ its strength) is suggested as a dusting powder on septic sores.

Preservation.—The Powder should be kept in stoppered bottles. The sterile Kieselguhr and Boric Acid may be kept ready mixed and the Chlorinated Lime added when required. Kepad containing stronger proportions of Chlorinated Lime may be prescribed, *e.g.* 10, 20, 30%, etc. Smaller proportions—1, 2%, etc.—of Chlorinated Lime may also be ordered—the ratio of Boric Acid and Kieselguhr being kept always the same, *viz.*, equal amounts. Kieselguhr commends itself as diluent on account of its light physical character and absorbent properties.—B.M.J. ii./16,147.

Dakin's (Stronger) Hypochlorite Solution.

The following method we find best in making large quantities:—

Rub Chlorinated Lime 150 into a smooth paste with 100 of water and add gradually, with stirring, Sodium Carbonate (Cryst. + $10H_2O$) 285, previously dissolved in water 900.

Allow to deposit, filter and titrate 20 Cc. of the filtrate with Boric Acid solution (31 Gm. per litre) using phenolphthalein suspended in water as indicator to ascertain the amount of boric acid to be added to the bulk. An excess is to be avoided; it is best to add slightly *less* than the calculated amount. Alcoholic solution of phenolphthalein cannot be used as the alcohol is at once attacked.

The titration must be done fairly rapidly. The amount of Boric Acid to be added is generally about 2% of the volume.

Strength.—This concentrated solution contains about 4 per cent. of sodium hypochlorite and is ***to be diluted with 6 parts of water for use.*** It can be kept for a month without serious decomposition.

The preparation contains small amounts of free hypochlorous and boric acids and a balanced mixture of the hypochlorites and polyborates of Sodium. Owing to the presence of these buffer salts the solution maintains approximate neutrality under most conditions, so that the irritating action of free alkali is avoided.

Dakin's (Weaker) Hypochlorite Solution. *Syn.* SOLUTIO DAKIN K.C.H.

Rub Chlorinated Lime (of good quality) 200 Gm. to a smooth paste with a little water and dilute with water *q.s.* to 5 litres. Dissolve Sodium Carbonate (Cryst. + $10H_2O$) 400 Gm. in a further quantity of 5 litres of water and add to the Chlorinated Lime suspension with thorough stirring or shaking.

After ½ hour the clear liquid is syphoned off and filtered through cotton wool. Boric Acid 40 Gm. is added to the clear filtrate (not before filtering). The solution should not be kept longer than 1 week.

For a comparison of strengths of Dakin's Solutions with Liquor Sodæ Chlorinatæ (B.P. '14), as also Bactericidal Power, see Vol. II.

Uses.—As a non-irritating antiseptic for treatment of wounds. Fresh quantities of the solution should be brought in contact frequently for a period of time. The solution assists in the dissolution of necrosed tissue, this being doubtless due to the ability of hypochlorites to attack the NH groups present in proteins, forming soluble chloramines—*cf.* Chloramine-'T.' Vol. II.

Liquor Sodæ Chlorinatæ (*B.P.* '14), owing to hydrolysis, gives rise to alkalinity, which increases with dilution:

$$NaClO + H_2O = NaOH + HClO$$

hence the Boric Acid was added with a view to neutralising the caustic alkali as formed.

The solution was first advocated for use by *Carrel's Method* (B.M.J. ii./15,318)—introduction into wounds by rubber tubes.

The rubber tubes are closed at the end and in the sides there are numerous small openings about a centimetre apart. Pieces of gauze are placed lightly round and between the tubes and the solution runs into the wound and irrigates it.

When applied for continued irrigation vaseline may be smeared on the adjacent skin to prevent irritation. Cicatrisation is not delayed even by continuous use.

N.B.—Not to be injected intravenously.

The best results in the first six months' trial in the war were in ambulance cases where the treatment could be begun early.

Results uniformly good on the wounded (57 cases) treated on board the *Rewa*. In badly septic cases the hypochlorite may be injected into the tubes (Carrel's method) every 2 or 3 hours for 24 or 48 hours.—F. J. A. Dalton, B.M.J. i./16,126.

Sloughing and dead and decomposed material quickly disappear. There must be no impermeable material outside the gauze. Care needed in locating the tubes, regulating the instillation, and in some cases ensuring that the patient's bed and clothing do not become soaked.—Sir G. H. Makin's Hunterian Oration, B.M.J. i./17,216; L. i./17,252. See also Sir B. Moynihan, B.M.J. i./16,336; B.M.J. ii./17,597; i./18,170.

Empyema treated.—R. A. Stoney, B.M.J. i./18,198.

Clockwork-controlled Douche in the Carrel-Dakin Method. Has been tested in a severe case of compound fracture of the tibia infected with *B. pyocyaneus*. The apparatus irrigated the wound satisfactorily.—C. W. Cathcart, B.M.J. ii./25,933.

* **Pantosept Tablets** (T.M. 449231)—a substitute for Dakin's Solution. They contain the stable Sodium Dichlorylsulphamido Benzoate, $Cl_2N.SO_2.C_6H_4.COONa$, which on dissolving in water gives Hypochlorous Acid and Sodium Sulphamidobenzoate, $NH_2.SO_2.C_6H_4.COONa$.—L. i./25,722.

Daufresne's Modified Dakin's Solution.

Chlorinated Lime 200 Gm. is shaken vigorously with 5 litres of water and left in contact for 6 to 12 hours. Sodium Carbonate (Dry) 100 Gm. and Sodium Bicarbonate 80 Gm. are dissolved in a further 5 litres. This solution is poured into the Chlorinated Lime Solution, the mixture well shaken and filtered.

The solution should contain between 0·45% and 0·5% Sodium Hypochlorite. Its use is particularly satisfactory if employed in the first 24 hours after the infliction of the wound. 75% of the deaths from wounds in war, it was stated, after the first 24 hours, were due to sepsis.—Sherman on Carrel's Sterilisation method.—L. ii. 16,800.

Liquor Sodæ Chlorinatæ Chirurgicalis, U.S.X., *Syn.* MODIFIED DAKIN'S SOLUTION, contains 0·45 to 0·5% NaOCl equivalent to 0·43 to 0·48% available Chlorine. Preferably to be kept not longer than 7 days. Made with varying quantities of Bleaching Powder and Sodium Phosphate according to the strength of the former.

Magnesium Hypochlorite is well tolerated by the tissues. Less caustic than the sodium compound. It has less antiseptic power, but twice as much can be used.

To prepare, mix Magnesium Sulphate 190 Gm. in 2 litres of water and interact with Chlorinated Lime 100 Gm. dissolved in the same amount of water and filter out the Calcium Sulphate.—B.M.J.E. i./16,16.

* **"Milton" Disinfectant** (T.M. 375959, Class 2, 381,513, Class 2 assoctd. and 382491, Class 3, assoctd.). This antiseptic contains Sodium Hypochlorite 1·01% with Sodium Chloride 16·8% and small quantities of Chlorate, Sulphate and Carbonate, and Calcium Chloride.

It is stated to be made by electrolysing Sodium Chloride resulting in the production of a stable form of Hypochlorite with only Sodium as a base. (Chas. Watt discovered an electrolytic process of making Hypochlorous Acid in 1859, since when there have been 'scores' of electrolytic processes advanced.—B.M.J. ii./15,809.) A deodoriser, preservative, insecticide and general antiseptic. It is stated to be harmless to the human system either internally or externally.

It is used for wounds and skin affections, either full strength or diluted down to 1 in 50 or more. For abscesses, fistulas, etc., it can be used undiluted. For the vagina and cervix 1 in 4.

For packing the vagina, gauze soaked in a 1 in 10 to 1 in 30 dilution. The pack changed every 12 hours for several days prior to operation.—W. Blair Bell, L. i./20,997.

In gonorrhœa of the female, prior to childbirth, a tablespoonful to the pint, as a vaginal douche, and half-tablespoonful to the pint for bladder and urethral irrigations in cases of urethritis.—C. W. Rundle, L. i./20,1268.

Pueperal sepsis. Advised, in cases where it is known at the time of labour that the uterine cavity has probably been infected by intrauterine manipulating.—Victor Bonney, B.M.J. i./20,266. Employ a 1 in 10 dilution for the first irrigation and later 1 in 30.—W. Blair Bell, B.M.J. i./21,695.

Has been found useful for syringing out antrum suppuration and for pyorrhœa and other suppuration in the mouth.

Dentures may be cleaned with it by the use of 10 *to* 20 *drops in a tumbler* of cold water overnight. Great care should be taken not to exceed these directions.

Antiseptic action of Sodium Hypochlorite solution, it is suggested, is not chemical but due to rays similar to ultra-violet emitted by solution.—Comptes Rend., '25,180,1615, per Pres., Jan. '26/6.

Chloramine-'T.' *Syn.* Chlorazene, or *p*-Toluene Sodium Sulpho-Chloramide. Chloramina U.S.X., with 11·5 to 13% active chlorine, Mianin P.G. VI.

$$CH_3.C_6.H_4SO_2.N.Cl.Na+3H_2O=281{\cdot}63.$$

('T' indicates relationship to Toluene, Chloramine being the name given to some Pastilles.)

Care should be taken to prevent confusion with *Chloramide*—an unnecessary, to our mind, contraction for Chloralamide.

It was originally made and studied by Chattaway.—Trans. Chem. Soc 87, p. 153 (1905).

Dose.—½ to 3 grains (**0·03 to 0·2 Gm.**) has been given diluted with charcoal.

Manufacture.—*p*-Toluene Sulphonamide is made by acting on *p*-Toluene Sulphone Chloride (a by-product in making Saccharin) with Ammonium Carbonate. The sulphonamide (1 mol.) is dissolved in 5% cold alkaline solution of Sodium Hypochlorite (1·2 mol.), warming gently if necessary, filtering and adding 1½ volumes of saturated brine. Chloramine-'T' crystallises out, is filtered off, washed with brine and dried in the air.

For the theory appertaining to use of Chloramine-'T' and its Bactericidal Power, see Vol. II.

Solubility.—A saturated solution contains about **1** in 7 at room temperature. It is soluble 1 in 2 of boiling water, 1 in 7 of glycerin, 1 in 12 of alcohol—by our experiments, but caution should be exercised with solutions in organic solvents. The aqueous solution is faintly alkaline and has a bitter taste. It is insoluble in Liquid Paraffin.

Incompatible.—Alcohol and Hydrogen Peroxide and many other substances. Should not be mixed with other antiseptics.

Uses.—For treatment of infected wounds and as a general surgical antiseptic, mouthwash, vaginal douche and for urethral irrigation. It is non-irritant and practically non-toxic; does not coagulate blood serum. Not suitable for intravenous use—has marked hæmolytic action.

Strength for Use—2 to 4%. The former is used for infected wounds and for general use—increased if required. Mouth-wash, nasal or vaginal douche or for urethral irrigation, 0·25 to 2%.

Vaginal douche of 0·05 to 1% Chloramine, either as preliminary to operation, or for disinfection of offensive discharges during pregnancy.—B.M.J.E. ii./25,8.

To *sterilise water* 1 in 250,000 of Chloramine-'T' is effective if a little Citric Acid (0·8 Gm. per litre) be added—the resulting water is not unpleasant to taste.—B.M.J. i./17,682. *cf.* Halazone.

In aqueous solution it is fatal in 10 minutes to the following organisms at the stated dilutions: *Streptococci*, 1 : 34,000; *B. Coli* 1 : 18,000; *B. Diphtheriæ*, 1 : 30,000; *Pneumococcus*, 1 : 22,000; *B. Dysenteriæ*, 1 : 22,000; *B. Typhosus*, 1 : 20,000; *Staphylococci*, 1 : 16,000.

Chloramine-'T.' Tablets 8·75 grains. Two in 2 ounces of water = 2%. Tablets 43·75 grains. One in ten ounces water = 1%. Two tablets = 2%.

Chloramine-'T' Gauze, 5 and 35% strength is made.—The former for general use; the latter as preliminary dressing of a wound.

Use *dry* and subsequently moisten if necessary when in position.

Highly spoken of for checking development of infective processes. Will effect a growth of new, healthy granulation tissue in a remarkable way.—Sir B. Moynihan, B.M.J. i./16,335.

Chloramine-'T' Ointment—Chloramine-'T' 10, Sodium Stearate 86, Water 4. As a dressing to a wound after it has become superficial and is healthily granulating. The content may be increased to 12% or reduced to 6%.—B.M.J. ii./17,597. A 1% *Cream* is usually employed.

Septamid is the Magnesium salt, used as an antiseptic for wounds.

References.

Mouth and jaw wounds treated with 2% solution. Non-irritant. Results in seven cases good.—A. R. Fisher, B.M.J. i./16,87.

Value of Chloramine-'T' and the hypochlorites appears to rest to a great extent on their action as solvents of necrotic tissue and power of destroying toxic substances since their bactericidal power in presence of serum is comparatively weak (*cf.* Flavine) and at the same time they greatly interfere with phagocytosis.—C. H. Browning and Colleagues, B.M.J. i./17,76.

Chloramines are powerful irritants. A thorough experimental study of effects of Chloramine-T on animals.—B. Fanlus & M. I. Smith, Jl. Pharm. and Exp. Therap., Nov., 1919.

Di-Chloramine-'T.' *Syn.* TOLUENE-SULPHODICHLORAMIDE, DICHLORAMINA U.S. X. $CH_2C_6H_4.SO_2.NCl_2$ = 239·042.

This substance enables an oily solution to be prepared, the corresponding monochloride being insoluble in oils.

Manufacture.—Shake thoroughly Chlorinated Lime 350 to 400 Gm. in water 2 litres for one hour and allow to deposit. Syphon off the clear liquor and filter off the remainder. Add Toluene-*p*-sulphonamide 75 Gm. to the liquor and shake to dissolve. Filter if necessary. Acidify in a separator with Acetic Acid 100 Cc. added in portions and extract the Dichloramine with Chloroform about 100 Cc. Dry the Chloroform layer after removal, with Calcium Chloride and allow to evaporate in the air. Recrystallise if necessary.—Chattaway (J.C.S.T. 1905, Vol. lxxxvii., p. 145).

Solubility.—It can only be used in oily solution, being insoluble in water.

Solution of Dichloramine-'T' in Chlorinated Eucalyptol-Paraffin.

Dissolve Dichloramine-'T' 2, in Chlorinated Eucalyptol 20, without heating, and add Chlorinated Paraffin 80.

The solution is relatively unstable and not to be used when a distinct precipitate appears.—E. K. Dunham and H. D. Dakin, Med. Res. Com., B.M.J. i./17,265,865.

Chlorinated Eucalyptol.

Treat Eucalyptol 100 Cc. with Potassium Chlorate 3 Gm. and Hydrochloric Acid (conc.) 10 Cc. for 12 hours or longer. Then wash with water and with Sodium Carbonate solution. Remove the water, add Sodium Carbonate 3 Gm., and allow to stand 24 hours. Filter and dry with a little Calcium Chloride.

Chlorinated Paraffin.

Employ Liquid Paraffin 100 Cc. with Potassium Chlorate and Hydrochloric Acid as above, exposing the mixture to the light, preferably sunlight, several hours. Wash with water, then Sodium Carbonate, then water again. Remove the oil, add a little Calcium Chloride and about 1 Gm. of Animal Charcoal. Shake and filter.

Russian Oils, containing much **Naphthenes**, are not so suitable as American (Pennsylvanian) Oils, which contain considerable quantities of **Olefines** as well. *cf.* Paraffinum Liquidum.

Uses.—This solution has been suggested for disinfection of the naso-pharynx in the treatment of meningococcus carriers and the carriers of other disease organisms.

Dichloramine-'T' in Eucalyptol-Paraffin solution applied to wounds by spray and covered with gauze. Dress again every 24 hours. Very little of it is required. It saves pain, as it is easily removed. Eliminates the Carrel tube.—J. E. Sweet, B.M.J. ii./17, 249. See also J. T. Morrison and co-workers, L. ii./18,230.

This Eucalyptol and Liquid Paraffin method is now superseded by the use of Paraffin Wax:—

Chlorcosane. *Syn.* PARAFFINUM CHLORINATUM, U.S.X. A chlorinated paraffin wax in the form of a light yellow oil slightly heavier than water, without odour and bland in use as a nasal spray or when placed on wounds. Employed chiefly as solvent of Dichloramine-'T.'

Manufacture.—Hard Paraffin of melting point 50° C. or higher is heated to about 120° C. and chlorinated. The temperature while the gas is being quickly passed into it should be kept within 125—140° C. Continue until the paraffin has increased in weight 45 or 55%. Hydrochloric Acid is evolved. The oil while still warm is then shaken vigorously with 5% of its weight of dry sodium carbonate and filtered.

To prepare a solution of Dichloramine-'T' (of which it will dissolve 8·5 to 10%, 7·5 to 8% is strong enough), a portion of the oil, *e.g.*, a quarter, is heated to 75 or 80° C. and the Dichloramine-'T' added. It dissolves. Then add remainder of the Chlorcosane. This solution is employed for nasal irrigation and for wounds.

Carbon Tetrachloride 10% may be added to make the solution more fluid for spraying.—H. D. Dakin and E. K. Dunham, B.M.J. i./18,51.

p-Sulphondichloramino-benzoic Acid. $Cl_2NO_2SC_6H_4.COOH = 270·026$. **Halazone.**

Manufacture, Notes on. *See Edn. XVIII., p.* 63.

When used to sterilise ordinarily contaminated water in 30 minutes, 1 in 300,000 is sufficient.

Soluble sparingly in water, insoluble in chloroform and petroleum. Soluble also in excess of cold Sodium Hydroxide solution, but with less quantity or with feebly alkaline salts, *e.g.*, phosphates or borates, hydrolysis occurs.

Tablets.—To prepare, powder the Sulphondichloramino-acid 4, with dry Sodium Chloride 92 and add dried Sodium Carbonate 4 (or dried Borax 8%). Pass through a No. 40 sieve (no lubricant required or indeed is to be used), and compress into tablets weighing 100 mgr.

Each tablet so made contains 4 mgr. of the Disinfectant—sufficient for a litre or a quart of reasonably heavily contaminated water.—H. D. Dakin and E. K. Dunham, B.M.J. i./17,682.

ACIDUM LACTICUM.

(**B.P. '14**) and numerous Pharmacopœias. $CH_3.CHOH.COOH = 90·048$.

Dose.—15 to 30 minims (**1 to 2 Cc.**), well diluted. U.S. *average dose* 30 minims.

A colourless, odourless, syrupy, sour liquid, obtained by the fermentation of milk sugar by the action of *Bacillus acidi lactici.* Lime or Zinc Oxide is used to neutralise the acid as formed. The respective lactates are then decomposed. It has Sp. Gr. 1·21 and contains not less than 75% by weight of hydrogen lactate and not less than 10% by weight of lactide $C_6H_8O_4$. FR. CX. has Sp. Gr. 1·24 at 15° C. —is nearly pure.

Solubility.—Is miscible with water, alcohol, and ether; it coagulates milk and albumin.

Uses.—It has been used locally in tuberculous ulceration of the pharynx and larynx, in diphtheria, &c., and internally for infantile and tropical diarrhœa, dyspepsia, and to allay cough in phthisis, and as a stomachic tonic in combination with iron and lime, and in vesical catarrh. As a paint, or paste with kaolin, or as a 50% injection, has been used in lupus, but is painful.

CHRONIC ENTERITIS treated with Lactic Acid 7½ minim doses *t.d.s.p.c.*, the rationale being that *B. Coli*, which is, as a rule, universally active in those cases where the motions are unduly offensive, cannot grow in a concentration of Lactic Acid of more than 1%.—I. H. Lloyd-Williams, B.M.J. i./23,1053.

Infants over 3 months in which attempts to give an adequate quantity of food have been attended by signs of intolerance frequently thrive on milk to which has been added Lactic Acid B.P. 1 drachm to the pint. The milk should be boiled for two minutes, allowed to cool, and must be beaten or shaken up while the acid is added slowly drop by drop. The culturing of the Lactic Acid Bacillus in the milk has also been of great value in certain types of cases.—B.M.J., ii./27, 1173.

Lactic Acid Milk Gt. Orm. H. is similar.

Test for in vomit, &c., vide 'Examination of Stomach Contents,' Vol. II.

Butyric Acid—$C_3H_7.COOH = 88·064$.—(with the characteristic evolution of hydrogen) may also be produced if the fermentation of milk sugar proceed too long, or if the lactic acid is not neutralised by lime or zinc oxide.

Acidum Lacticum Dilutum (B.P. 1885). Sp. Gr. 1·040. Lactic Acid 3 ounces, Distilled Water *q.s.* to 1 pint. *Dose.*—½ to 2 drachms (2 to 8 Cc.).

Injectio Acidi Lactici.

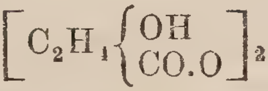
Lactic Acid 4 to 6 drachms, Water to 1 ounce. To be introduced by means of a submucous laryngeal syringe into the tissues of the larynx.

Nebula Acidi Lactici.

Lactic Acid 1, Distilled Water 15. Of some use in diphtheria; appears to have the effect of dissolving the membranous exudation.

Spiritus Acidi Lactici.

Lactic Acid 3, Castor Oil 2, Lavender Water 4, Alcohol 90% to 24. Suitable for treatment of alopecia areata. To be rubbed in gently at first, later with some friction.

Calcii Lactas (*B.P.*'14), P.Jap.IV  $\left[C_2H_4\begin{cases}OH\\CO.O\end{cases}\right]_2 Ca + 5H_2O = 308{\cdot}23$.

Dose.—10 to 30 grains (0·6 to 2 Gm.).

An opaque, white, crystalline powder, antiseptic and stomachic, and given for rickets; soluble in water, 1 in 15 if freshly prepared.

Manufacture.—Pure Calcium Lactate can be made by precipitating the cold saturated solution with Acetone and then washing first with Acetone and then with Ether. B.P. requires 93% pure.

Flavoring.—It is practically tasteless; if desired to flavor any Glyl or Syl may be prescribed.

Uses.—Urticaria and chilblains have been treated with it. Chilblains are stated by Sir A. E. Wright to be caused by thinness of the blood, which permits of effusion into the tissues and consequent swelling and inflammation. Is useful to give prior to operation to increase coagulability of the blood, but in a case it was found not suitable *per os.* (According to Dixon must be *injected* to produce the effect—*cf.* Calcium Chapter.) Further, hypodermically, it has produced painful coagulation locally and collapse.

CHILBLAINS in the adult treated with 15 grain doses dissolved in 1 ounce of Chloroform Water with ½ to 1 minim of Capsicum Tincture, thrice daily one hour before meals, to be continued over six weeks. Constipation, which may be expected, is to be corrected by Senna Pod Infusion.

Chilblains well treated with Calcium Lactate on an empty stomach before breakfast; three 5 grain tablets daily for prophylaxis for a week. For treatment, 9 tablets daily, three before meals. Not to be given in excess.—D. C. Nasmyth, L. i./26,416.

Hæmoglobinuria, œdema of the feet, boils, eczema, scurvy, urticaria, erythema, lichen planus, gouty pruritus, pruritus ani, have also been treated with success. It has also been advocated in epilepsy.

Colour blindness has been treated by Calcium Lactate—the theory being that it stimulates metabolism, hence ought to stimulate retinal cells to respond more to colour sensations.

POST-PARTUM HÆMORRHAGE treated. Six multiparæ, who had suffered more or less from hæmorrhage in previous confinements, treated with 3 Gm. doses *pro die* for some time before delivery. In all the hæmorrhage appeared to be less than normal, but the treatment was not entirely satisfactory. In a girl of 13, however, suffering from metrorrhagia which had refused to yield to Hydrastis or Ergotin, Calcium Lactate arrested the discharge in three days.

ERYTHEMA with periodical return. Drachm doses were most effectual, to our knowledge.

SPASMODIC RHINORRHŒA—a case of an annual sufferer from hay fever relieved by tapping antrum and washing out, giving Vaccine from the *B. Coli* isolated in pure culture from the pus and full doses of Calcium Lactate.—L. ii./12,1012.

MIGRAINE aborted by 30 grains Calcium Lactate at first warning of onset.—B.M.J.E.i./26,61.

For further notes on the administration and removal of lime salts from the tissues, vide Calcii Chloridum.

Calcium Lactate Tablets contain 5 grains each.

Liquor Calcii Lactatis. *Syn.* MISTURA CALCII LACTATIS. *Martindale.*

Dose.—½ to 2 ounces (=15 to 60 grains Calcium Lactate). Calcium Carbonate 4, Lactic Acid (75% strength) 8, Water to 180. This, if stored in well corked bottles, keeps satisfactorily.

Normally the amount of ionised Calcium in the blood tends to rise at the end of pregnancy owing to lessened demands of the fœtus and these salts greatly influence the tone of involuntary muscle fibres. Pregnant women should take 2 ounces of a mixture of this kind every night with Infundibulin 0·5 Cc. intramuscularly night and morning for a fortnight before parturition is due.—W. Blair Bell, B.M.J. ii./21,545.

✱**Kalzana Tablets** (T.M. 408762) are stated to contain 7½ grains of Calcium-Sodium Lactate. To supply calcium deficiency and advised for expectant and nursing mothers and growing children.

Ferri Lactas (Ferrous), FR. CX., **P.Belg., P. Ital., P. Jap., Ph. Ned. V.** $(C_2H_4OH.COO)_2\ Fe+3H_2O=287{\cdot}958$.

Dose.—1 to 5 grains **(0·06 to 0·3 Gm.).**

In greenish-white crystals, soluble 1 in 60 of water; when taken internally is easily assimilated by the system.

Calcii Lactophosphas.

Dose.—3 to 10 grains **(0·2 to 0·6 Gm.).**

Crystalline or amorphous powder. Is often a mixture of equal parts of calcium lactate and (dibasic) calcium phosphate. Soluble in water. Stomachic tonic. In cardiac disease useful (Brunton).

This salt has properties similar to Calcium Lactate *v. antea.*

Syrupus Calcii Lactophosphatis (*B.P.* '14).

Dose.—½ to 1 drachm **(2 to 4 Cc.).**

Mix Calcium Lactate 7·5 with Water 40 and add Concentrated Phosphoric Acid 4·5 (volume), dissolve and add Orange Flower Water 2·5. Filter and dissolve Refined Sugar 70 in the solution without heat and add Water *q.s.* to make 100.

Dusart's Syrup. *Dose.*—2 drachms to ½ ounce **(8 to 15 Cc.).**

Calcium Carbonate 9, Lactic Acid 75% 22, Phosphoric Acid 10% 88, Water *q.s.* Dissolve the Calcium Carbonate in the Lactic Acid diluted to 108 with Water with the aid of heat. Cool and add the Phosphoric Acid, and make up to 370. Dissolve in this Sugar 623, and add Spirit of Limes 7. Mix and adjust to 1,000. *All parts by weight.*

Liquor Calcis Lactophosphatis. LACTOPHOSPHATE DE CALCIUM DISSOUS. FR. CX.

Rub Dibasic Calcium Phosphate 17, smoothly with Water 964, add Lactic Acid 19 (FR. CX., Sp. Gr. 1·24, practically pure acid)—all by weight. Shake to dissolve; filter.

Syrupus Calcii et Ferri Lactophosphatum.

Dose.—½ to 1 drachm **(2 to 4 Cc.).**

Dissolve by aid of slight heat Ferrous Lactate 150 grains with Potassium Citrate 150 grains in Water 1 ounce, and add to Syrup of Calcium Lactophosphate 20 ounces.

Plumbi Lactas. $(C_2H_4OH.COO)_2Pb = 385{\cdot}28$.
A white crystalline powder, soluble in water.

Sodii Lactas. $C_2H_4.OH.COONa = 112{\cdot}022$.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**).

Usually in form of yellowish syrupy liquid miscible with water, containing 75% of the salt. Large doses are said to be hypnotic.

In scorbutic symptoms this is better than sodium citrate.

In diabetes mellitus, when there is tendency to acidosis, give Sodium Lactate or Citrate in 40 grain doses, thrice daily.—Sir William Willcox. Three cases treated.—B.M.J.E. ii./21,14.

Prior to the use of Chloroform, the administration of Sodium Lactate has been suggested to prevent possible acidæmia.

Elixir Sodii Lactatis. *Dose.*—1 drachm=10 grains.

Prepared with Simple Elixir (B.P.C. 1894), this is a palatable and convenient method of administration.

ACIDI LACTICI BACILLI.

We give here the salient points of Prof. Metchnikoff's well-known though criticised Lactic Acid Bacillus Therapy. In Vol. II. the subject is further dealt with.

***Fermenlactyl** (T.M. 297401 class 42 and 348311 class 3 assoctd.). ***Lactigen** (T.M. 310058), ***Lacteol** (T.M. 317182), ***Lactobacilline** (T.M. 290294, 321883, class 42), ***Sauerin** (T.M. 297939), and ***Trilactine** (T.M. 302646) are commercial preparations of Lactic Acid Bacilli. **Liquid Cultures** are also on the market. These latter only remain active a month or less.

It is stated that *moulded* tablets show a higher initial count of the bacillus than compressed tablets.

***Trilactine Tablets** contain *B. Caucasicum* as their principal active constituent. They are intended for therapeutic use to be taken *per os* or for curdling milk (*vide infra*). For the former they are best taken in conjunction with a little milk sugar (the bacillus *does not ferment cane sugar or maltose*), *e.g.*, dissolved in a little boiled (and cooled) water.

Dose.—Three to six per diem after meals.

Trilactine Tablets, Intestinal, *i.e.*, coated to render them less likely to dissolve in the stomach than in the intestinal tract, are also prepared. These are not for curdling milk.

The treatment, according to severity and nature of the case, extends over one to three months.

Patient must avoid—

Foods such as gravy, meat jelly, meat extracts, white of egg, fat meat, high game, &c., which would act as culture-media for proteolytic bacilli.

Lactobacilline-Glycogen Tablets contain in addition to Metchnikoff's Lactic Acid Bacillus, the spore-bearing amylolytic organism *B Glycobacter.* This organism converts amylaceous substances into sugar in the intestine and is said by Metchnikoff to be a favourable addition.

Lactic Acid Bacilli—Curdled Milk. ***Trilactine Milk.**

Dose.—1 pint or more (less if not tolerated) per diem, divided into 2 or 3 portions.

After the bacilli have appeared in the stools, one daily dose, first thing in the morning or evening, is given. It is usually preferred during or after meals, but if taken on an empty stomach the organisms will pass through to the duodenum with less contamination with the stomach juices. It is desirable to undergo the treatment for 3 weeks, then stop for a period before proceeding again.

The patient should prolong the treatment. It should not be given up the second week if flatulence is produced or constipation increased.

Preparation of Curdled Milk.—This forms an agreeable mode of treatment with active Lactic Acid Bacilli. Absolute sterilization of the milk before introducing the lactic organisms is essential. An organism dividing three times an hour (as mentioned in a contribution on "Surgical Methods" by Sir W. Watson Cheyne), which is a fair average, will give rise to something like thirty-three million bacteria in twelve hours. To kill all organisms in milk would necessitate exposure to a temperature of 108° to 120° C. (226° to 248° F.), which would give the milk an unpleasant flavour. Pasteurising at 140° F. is not sufficient to kill *B. tuberculosis* or the spores of the butyric bacilli. Metchnikoff, therefore, advised boiling for several minutes. For safety an hour would be preferable, but previously pasteurised milk as is supplied in London and other large cities, may be used after 'bringing to the boil.'

We find the organism grows best at about 44° C. (110° F.) *N.B.* —Acid production ceases at a slightly higher temperature.

The required quantity of milk (a pint or a quart being a customary day's supply), cooled to about 40° C. (104° F.) (this can be done expeditiously by standing the saucepan with lid on, in a basin of cold water), is placed in a suitable jar or basin so arranged with a small light beneath that a temperature of 40° to 45° C. (104° to 113° F.) —not higher—can be maintained for eight to ten hours,—a ventilated dry heat (hot air) will work satisfactorily. For a pint of milk two or more active Lactic Acid Bacilli Tablets—the quantity varies with the different brands—are crushed, *e.g.*, with a spoon, in a little of the previously heated and then cooled milk (reserved for the purpose), to make a paste and stirred into the remainder of the milk in the jar. For a quart four or more tablets should be employed. The milk will then (or a little later *v. infra*), have formed a junket ready for consumption. If the Curdled Milk be 'over made' (*i.e.*, much whey formed on the top), the heat must be reduced till the correct adjustment is ascertained.

Curdled Milk may be taken, according to taste, either with sugar, or with cream and sugar, or with sugar and a little powdered cinnamon, or ginger as flavoring. It is usually taken 12 to 24 hours after souring has been started. We find in our experiments that, after 8 to 10 hours, *B. Caucasicum* is in great preponderance in the cream —the bacilli appear to be carried up with the milk fat.

The milk must be free from preservatives and in all respects as fresh and pure as can be obtained.

B. Acidophilus.—Cheplin and Rettger say Metchnikoff worked with this and not *B. Bulgaricus*.—Pres., Dec. 23,408. It is a first cousin of *B. Bulgaricus* and not easy to distinguish. Doubt as to any real value in the acidophilus therapy. *B. Acidophilus* is a normal inhabitant of the human intestine. Large quantities of the milk have to be taken, *e.g.*, 1 litre a day, together with 300 Gm. lactose.—B.M.J. i./26,713.

OBSTINATE CONSTIPATION relieved almost without exception by daily doses of milk containing cultures of *B. Acidophilus*. Should be prepared in the laboratory.—L. ii./26,341.

In sprue of benefit.—Jl. Trop. Med., Jan. 15/27, 23.

Pharm. Form. says acid-production in milk begins immediately the milk is drawn from the cow, and in 48 hours sufficient acid (1%) is produced to coagulate the milk at normal temperature. For this reason dairy farmers have been known to add sodium bicarbonate, to counteract acidity and act as preservative. Some medical men think sodium lactate to be provocative of diarrhœa, and object to the addition.

Uses.—Both the Tablets and the Curdled Milk are used for summer diarrhœa in children, diarrhœa and constipation in adults, skin affections, such as eczema and psoriasis, acne and furunculosis, infective disorders of the intestinal tract, such as typhoid, dysentery, for intestinal tuberculosis and tuberculous diarrhœa, and for cancer of the stomach or intestines, and in enteritis and colitis generally. Also as a cholagogue in hepatic congestion and gallstones, and in threatened appendicitis. May be of use in migraine, neurasthenia, and loss of appetite. The Milk acts as a lubricant to the digestive tract, forming a pleasant article of diet, and may be taken in comparative health, as a nutrient and antiputrefactive.

Contra-Indications.—In some cases, notably in chronic acid gastritis, the stomach will not tolerate the Curdled Milk. Many cases of enteritis are aggravated by milk in any form. Personal idiosyncrasy also enters into consideration. Suitable cases, those in which abnormal putrefaction of proteid. Unsuitable, where symptoms due to carbohydrate fermentation.—G. Herschell.

CHRONIC ENTERITIS in infants. Lactic Acid Milk, soured biologically, has high curative value, and possibly of value in infantile eczema and severe urticaria, but use of soured milk in the average home fraught with danger from pathogenic contaminations.—E. Cassie and U. Cox, L. ii./26,325.

✱**St. Ivel Lactic Milk** employing either *B. Bulgaricus* or *B. Acidophilus* is issued in card containers sufficient for a week's use, two cupfuls *pro die*. The arrangement is hence convenient.

✱**St. Ivel Lactic Cheese** is stated to contain 1·55% Phosphate calculated as Phosphoric Acid, of which about 68% is in organic combination. *B. Bulgaricus* is also present, and the number of organisms which have been found approach the number existing in soured milk.

✱St. Ivel is T.M. 433956, Class 3. A number of T.M.'s are also on the Register in Class 42.

Local Use of Lactic-Ferment Preparations.—A fresh culture of lactic acid organisms has been used to free the urethra from bacteria, *e.g.*, in gonorrhœal infections. An ounce injected night and morning for a week resulted in lactic organisms only being found.

Vaginal Suppositories of Lactic Acid Bacillus—A hard gelatin capsule (No. 11) is filled with Syrupy Glucose—one daily for gonorrhœa. Upon decomposition of the glucose, acid is formed in which the large Bacillus Doderlein—a normal inhabitant—can grow. The acid kills off the pathogenic bacteria.—P. H. Marsden, P. J. i./20,365.

Cystitis has been treated by irrigation of the bladder with *B. Bulgaricus*.

Vulvitis treated by smearing a paste of Bulgarian soured milk all over the vulva introducing if necessary a tampon soaked in it into the vagina. Combine this with gonococcic vaccine.—T. J. Abraham, Clin. Jl., Feb. 14/23,73.

Buttermilk contains Protein 3, Fat 0·5, Sugar 4·8, Water 91 per cent.

Contains less fat than soured milk. The ordinary Lactic Acid Bacilli found in this are not so active nor resistant as those contained in Bulgarian Sour Milk. Milk in any form, however, in sufficiently large quantity tends to lessen internal putrefaction. Erysipelas has been cured by Buttermilk internally and locally.

MALNUTRITION IN INFANCY.—Some cases of atrophy appear to do well on skim buttermilk or unskimmed diluted Lactic Acid Milk. Indeed most children over three months tolerate large quantities of milk if previously soured.—C. Chisholm, L. ii./22,497.

ACIDUM NITRICUM.

" *Poisonous—Not to be taken.*" *For Conditions of Sale v. p.* 42.

$HNO_3 = 63 \cdot 016$.

Dose.—1 to 4 minims (**0·06 to 0·25 Cc.**).

(B.P. '14.) Sp. Gr. 1·42, contains 70% by weight hydrogen nitrate. U.S. 68%; PH. NED., 50%; P. HELV. and P.G. VI., 25%; FR. CX., 63·64%; P. ITAL., 65·3%.

Uses.—Strong oxidising agent. A caustic to warts and condylomata. Acne pustulata has been treated by stabbing with a stick dipped in it.

Quantitative Estimation.—By reduction with nascent Hydrogen into Ammonia, which is precipitated as Ammonio-Platinic Chloride or titrated with Standard Hydrochloric Acid.

A direct method of estimation is with the aid of Nitron (diphenylene-anilodihydro-triazole), which gives an insoluble nitrate—the precipitation being quantitative. It also precipitates Picric Acid.—C.D. i./17,286.

Acidum Nitricum Dilutum (*B.P.* '14).

Dose.—5 to 20 minims (**0·3 to 1·2 Cc.**).

Contains (B.P. '14), U.S. IX. and P. HELV. 10% by weight. PH. NED. quadri-normal. FR. CX. 10% approx. Tonic and biliary stimulant.

Incompatible with alkalis, sulphides, hyposulphites, ferrous sulphate, and alcohol.

Antidotes as for Hydrochloric Acid, *q.v.*

Chloroform in 5 drop doses every ten minutes will prevent the convulsions following the inhalation of nitrous fumes, as in the accidental breaking of a bottle of nitric acid.—C.D. ii./05,130.

Poisoning by small quantity taken in mistake.—B.M.J. ii./08,1679.

Acidum Nitricum Fumans. '*Poisonous—not to be taken.*' Sp. Gr. 1·5. (P. Jap. 1·486 to 1·5; P.G. VI. has 86%, Sp. Gr. at least 1·476.)

A reddish-brown liquid, giving off yellowish-red fumes. Contains about 91% by weight of hydrogen nitrate. Used as a caustic.

Acidum Nitro-hydrochloricum, U.S. IX. (Strong). (Not now in U.S.) Nitric Acid 9, Hydrochloric Acid 41, to produce 50. '*Poisonous.*'

Aqua Regia is Nitric Acid 3, Hydrochloric Acid 4. '*Poisonous.*'

ⓅACIDUM OXALICUM.

$(COOH)_2 2H_2O=126{\cdot}048$.

White crystals soluble in water about 1 in 9; a powerful poison. Manufactured by acting upon wood, sugar, starch, etc., with Nitric Acid. The cerium and iron salts are used in medicine, *q.v.*

A German patented process for production consists in passing Acetylene gas through Nitric Acid (S.G. 1·305).—P.J. i./25,13.

The toxicity of this acid in dilute solution and of its salts is due to their forming an insoluble calcium salt, a sufficient quantity of calcium in solution being essential for the welfare of the organism. Strong solutions of the acid are poisonous by corrosive action. Toxic symptoms and cardiac depression can be relieved by giving soluble Lime Salts.

Antidotes.—Apomorphine Injection, Calcium Saccharate Solution, Chalk, Castor Oil, Stimulants. Do *not* give alkalis, *e.g.*, Soda or Potash which form *soluble* oxalates.

Oxalic Acid poisoning—two cases where 10 or 20 Gm. had been ingested. Treatment with infusion of isotonic or hypertonic solution of Glucose, as retention of urea seemed to be the principal disturbance. Both cases recovered promptly and completely.—Per Jl.A.M.A. ii./25,1170.

Sal Limonis.—SALT OF SORREL OR SAL ACETOSELLA, SALACETOS.

Commercial samples, variously labelled Potassium Acid Oxalate, Superoxalate, Tetraoxalate, Quadroxalate, and Salts of Sorrel and Lemon, were found to be all Potassium Quadroxalate, $K.H.C_2O_4.C_2O_4.H_2.2H_2O$. There was no evidence that Potassium Binoxalate, $KH.C_2O_4.H_2O$, (*Syn* Acid Potassium Oxalate) is now a commercial salt.—I. A. Purdie, C. & D. i./25,198.

Salt of Lemon is used for removing ink stains, iron mould, cleaning leather, &c., and removing the colour from calico printing. Has been given for scurvy. *Dose.*—$\frac{1}{4}$ to $\frac{1}{2}$ grain. Is very poisonous, with which word it must be labelled.

'Poisonous—not to be taken'—Soluble Salts of Oxalic Acid.

In Gt. Britain and N. Ireland, Oxalic Acid is Ⓟ and soluble salts of Oxalic Acid are in Section 5 *of the* 1908 *Poisons and Pharmacy Act (Poisonous Substances): whereas in the Irish Free State Oxalic Acid and all Oxalates are Ⓟ, and therefore can only be sold by registered persons. In addition, soluble salts of Oxalic Acid must there be labelled 'Poison,' 'Poisonous,' and 'Not to be taken.' For further conditions of sale see p.* 42.

ACIDUM PHOSPHORICUM CONCENTRATUM.

$H_3PO_4=98{\cdot}051$.

Dose.—1 to 4 minims (**0·06 to 0·25 Cc.**).

Antidotes.—As for Hydrochloric Acid, *q.v.*

Hydrated Phosphoric Acid, containing 66·3% of hydrogen orthophosphate, corresponding to 47·4% of phosphoric anhydride; Sp. Gr. 1·5. Commercially, it is also prepared, having Sp. Gr. 1·75, and containing 64·3% of the anhydride=88·8% H_3PO_4 (U.S. is 85 to 88% H_3PO_4). This strength may be reduced to *B.P.* '14 strength by adding to each 3 parts by weight 1 part of distilled water.

FR. CX. and P. Ital. 50% by weight of H_3PO_4. Sp. Gr. 1·349.

‘**Acidum Phosphoricum**’ P.G. VI. and PH. NED. V., is 25% H_3PO_4.

See Vol. II. for Analysis and further details.

Acidum Phosphoricum Dilutum (*B.P.* '14).

Dose.—5 to 20 minims (**0·3 to 1·2 Cc.**).

Contains (**B.P. '14**), U.S. and P. Helv., 10% H_3PO_4. Sp. Gr. 1·057. Dilute Concentrated Phosphoric Acid (66·3%) 106·3 Cc. with Distilled Water *q.s.* to 1000 Cc.

Incompatible with alkalis, ferric chloride, lime salts.

Uses.—A nerve tonic and hæmatinic. Said to increase the proportion of phosphates in the red blood corpuscles, and to increase the coagulability of the blood. Well diluted, is a pleasant cooling drink in fevers, and relieves thirst in diabetes. It renders iron preparations compatible with astringent vegetable infusions.

ACIDUM PICRICUM (*B.P.* '14).

P. JAP.; FR. CX. *Syn.* CARBAZOTIC ACID; TRINITROPHENOL. U.S.

$C_6H_2.OH.NO_2.NO_2.NO_2$ [1 : 2 : 4 : 6]=229·043.

Dose.—¼ to 2 grains (**0·016 to 0·12 Gm.**).

Is formed by cautiously adding phenol to fuming nitric acid, heating the mixture, and purifying by re-crystallizing. It is in yellow, shining, bitter tasting crystals, which melt at 125·5° C.—the yellow liquid may be distilled without decomposition. Heated rapidly to 300° C. in the open it burns.

For details of this and other compounds as explosives, see Vol. II.

Solubility.—1 in 90 of water with yellow colour, and 1 in 10 of alcohol 90%, and in ether about 1 in 20.

Use.—Solutions or ointment are applied in the treatment of burns, erysipelas, pruritus, eczema, chilblains and gonorrhœa.

In stomatitis mercurialis a watery paste of the acid has been applied every 2 days—relieves pain and removes ulceration.

Picric Acid 6 grains in 2 grain doses at intervals of some hours taken without harm. Turns urine orange coloured.—Walter Smith, B.M.J. i./17,618.

Lotio Acidi Picrici, 1% aqueous (St. Th. H.).

For burns cotton wool impregnated with this lotion is used. Recommended by H.M. Inspectors of Explosives to keep handy as First Aid for burns.

After 48 hours remove and wash with Potassium Permanganate 5 grains in Water 16 ounces. Washing with weak ammonia and then with hydrogen peroxide removes the stains.

The method is not always satisfactory—may cause toxic symptoms. Cleaning the parts and rubbing off blisters with Alcohol—under Chloroform anæsthesia—is preferred by E. C. Milligan, Austral. Med. Jl., Jan. 4/13. *See* abstract p. 117.

In naval warfare Picric Acid found efficacious as a first dressing, but subsequently moist, and mild antiseptics found more suitable.—Surgeon-General H. D. Rolleston, B.M.J. i./17,224; L. i./17,258.

Burns due to Cordite were treated on H.M.S. 'Lion' and 'Tiger' in the Jutland battle with Picric Acid solution. Found a suitable dressing, but if left on too long it dried and was difficult to remove. As a second dressing 5% mixture of Eucalyptus in Olive Oil, sterilised by boiling, and if acid made alkaline by Lime Water.—B.M.J. ii./16,598.

GONORRHŒA treated by 1 in 400 to 1 in 200 solution as irrigant. An extremely potent germicide, and good when tolerated.—D. Lees, B.M.J. ii./21,480.

Gonorrhœa in women treated with a douche of two teaspoonfuls of Picric Acid in 64 ounces of hot water followed by Protargol Tampon and Ointment.—B. W. Turner, Abst. Pres., Oct., 20/363.

Poisoning by application of.—A child of 2 to 3 months Severe burn of the foot from boiling water treated with a dusting powder containing varying amounts, 7 to 17% of the Acid. Vomiting and severe diarrhœa. Temperature rose to 100° F., and pulse varied from 100 to 150. General erythema developed, and child died on 22nd day after the accident. —South African Med. Record, July, 1912, per L. ii./12,471.

Gauze and Wool, impregnated with **Picric Acid** are prepared.

Pigmentum Acidi Picrici et Camphoræ.—Picric Acid 2, Camphor 50, and Alcohol 90% to 100. Ringworm well treated by this Pigment.—A. Savill, Pr. July 13/94.

Sig.—"Inflammable. To be painted all over the scalp twice daily." The hair is to be clipped quite close, and the scalp washed once or twice a week, and covered by a calico cap. Generally the ringworm hairs are loosened, and come away with their bulbous portions in from ten to thirty days. A slight yellow staining of the hair may be noticeable some weeks after treatment. A. W. Williams, Brit. Jl. Dermat., June, 1912. Slightly modified.

C.D. ii./13,931 advises Picric Acid 1 drachm, Camphor 2 drachms, Alcohol 4½ ounces, to be painted on scalp, after previously washing with Ether, until there are no diseased hairs left.

Unguentum Acidi Picrici, 1 to 3%, for pruritus of scrotum and gonorrhœa.

For burns : Relieves pain and may be left 48 hours without changing. For burns of the eye, Ointment 2% preferred by some to solution, using a little cocaine solution beforehand.

'Collapsubes' of Picric Acid Ointment, ½% in soft paraffin basis, are supplied with catheter attachment for urethral medication.

Papillary erosions of the cervix uteri have been treated with saturated alcoholic solution swabbed for three minutes twice or thrice weekly.

Vaccinated surfaces treated by painting with a 4% alcoholic solution 48 hours after insertion of the lymph, lessens the degree of reaction. Makes a kind of natural dressing. Picric Acid is stated to be about four times as efficient as phenol as a local antiseptic.

General and protracted dermatitis in 4 out of 52 cases in which a 5% Alcoholic solution of Picric Acid was used as skin disinfectant.—J. Foged, Hospitalstid, Sept. 24, '25,889, per Pres., Oct. '26,352.

Wounds, apart from burns, have been well treated.

Ammonii Picras.—$C_6H_2(NO_2)_3O.NH_4=246{\cdot}08$.

Dose.—$\frac{1}{6}$ to $\frac{1}{2}$ grain (**0·01 to 0·02 Gm.**) in solution.

Yellow crystals *exploding* if rapidly heated in a test tube, but without loud detonation. To our knowledge 4 ozs. in a bottle were dropped and the bottle broken on the stone footway without exploding

Soluble 1 in 100 of Water, 1 in 85 Alcohol.

Uses.—This and the Potash Salt have been thought to act like

Quinine: they are also used for hardening tissues prior to microscopic examination and as a urine test for albumin, *q.v.*

Malaria has been treated by Ammonium Picrate in India.—Maj. E. E. Waters.

Mistura Ammonii Picratis.

Dose.—½ ounce (15 Cc.) thrice daily.

Saturated Ammonium Picrate Solution 30 minims, Syl Aurantii 1 drachm. Water to ½ ounce.

Indicated after febrile diseases with loss of appetite and asthenic condition. Generally given with a clean tongue, but even when dirty the salt does not seem to disagree. It takes the place of strychnine to a great extent, and is a really valuable drug. In explosive factories it is stated workmen take it as a bitter tonic.—F. Fowler Ward, Ipswich.

ACIDUM PYROGALLICUM. (U.S. X., PH. NED. V.)

Syn. PYROGALLOL, $C_6H_3(OH)_3$ 1 : 2 : 3=126·048.

Dose.—½ to 1½ grains (0·03 to 0·1 Gm.) in aqueous solution, or in pills with syrup—freshly prepared, and kept from the light.

Manufacture.—By heating gallic acid.

In light small white odourless crystals, with M.Pt 131 to 132° C., producing a sensation of coolness on the tongue. It has great affinity for oxygen.

Solubility.—One in 2 parts of water, about 1 in 1 of alcohol 90%, and in 10 parts of melted lard.

Uses.—Antiseptic in skin affections and in ringworm. Ointment 2 to 10% sometimes combined with Salicylic Acid 2 to 5% and Ichthyol about 5%. It darkens the skin, used with Silver Nitrate blackens the hair. Large doses poisonous. Seldom used internally.

Lupus vulgaris, if the area is not too large, 40% plaster as caustic, afterwards 10% Ointment is a good treatment, or apply the Ointment for a long time (until blister rises), then proceed with 2% Ointment, finally with a weak (0·1%) ointment.

SYPHILITIC ULCERATIONS, resistant to usual treatment, well treated with Pyrogallol Ointment—2% for two days, 10% for two days, 20% for two days, and 30% for 8 days. The urine has to be controlled (black coloration with overdoses), undermined edges removed, and surrounding tissues protected with Zinc Paste.—Jl.A.M.A. ii./25,314.

Fatal poisoning following treatment of a universal psoriasis with ointment containing Pyrogallic Acid. Patient collapsed five minutes after covering about 2/3 of body with ointment. Estimated absorption of about 10 Gm. of Pyrogallic Acid.—per Jl.A.M.A. ii./25,555.

Acidum Pyrogallicum Oxidatum (*Syn.* PYRALOXIN). A brownish insoluble powder prepared by the action of air and ammonia on Pyrogallic Acid. 3 to 10% ointment for skin affections.

Eugallol, $C_6H_3(OH)_2(CH_3COO)$=168·064, Pyrogallol-Monacetate.

Manufacture.—Add Acetyl Chloride 78 to Pyrogallol 126 with stirring. When thoroughly mixed heat to 60° C. ½ hour. Neutralise the syrup with Sodium Carbonate and extract with ether. This product is mixed with 50% Acetone (*i.e.* 2 of product and 1 of Acetone).

A yellowish syrupy liquid, applied in skin affections mixed with an equal iantity of acetone with a brush. **Lenigallol.** Pyrogallol-Triacetate, $_{}H_3.(CH_3.COO)_3$ = 252·096 in white powder, is much weaker, may be sed with zinc paste in acute and chronic eczema.

Manufacture.—Lenigallol is made by combining Pyrogallol 1, with cetic Anhydride 3, in presence of fused Sodium Acetate 3 at boiling temerature. The oily compound solidifies on cooling, and is recrystallised. .Pt. 157° C.

ACIDUM SALICYLICUM (*B.P.* '14).

$C_6H_4.OH.COOH$ 1 : 2 = 138·048. *Syn.* **ORTHO-OXY-BENZOIC ACID.**

Meta and *para* Oxybenzoic Acids have very feeble action of any kind—ther anti-rheumatic or anti-fermentation. Much larger doses—135 and 180 rains respectively—are required to kill rabbits than with Salicylic Acid (60 90 grains).—R. Stockman, B.M.J. i./13,598.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**) in cachets.

FR. Cx. ***Max. single dose*** **1 Gm.; max. during 24 hours 4 Gm.**

Manufacture. — Salicylic Acid (artificial acid) of commerce is iade by H. Kolbe's method devised in 1874, by heating Sodium Phenate in current of Carbonic Acid, or by a modification of it. The Basic Sodium alicylate so formed is decomposed with Hydrochloric Acid. A modification R Schmitt's) consists in heating the Phenate and Gas under pressure; this more economical.

Potassium Phenate is also employed as starting point.—C.D. ii./14,313.

It may also be prepared from Salicin and from Oil of Wintergreen *aultheria procumbens,—Ericaceæ*) and sweet birch (*Betula lenta,—etulaceæ*). **For internal use** this **NATURAL ACID** is preferred. n artificial acid, **Physiologically Pure,** is also free from imurities. **"Powdered Acid"** forms a third variety.

In colourless prismatic crystals, odourless, but its dust irritates the ostrils, taste sweetish. M. Pt. 156° to 159° C.

Soluble 1 in 500 of cold water, 1 in 3·5 of 90% alcohol, 1 in 40 f 45%, 1 in 2 of ether, about 1 in 80 of olive or almond oil, 1 in 100 f castor oil, 1 in 200 of glycerin, and 1 in 55 chloroform; soluble lso in melted fats and soft paraffin; 20 grains of salicylic acid are endered soluble in an ounce of water by the addition of 25 grains f borax. Ammonium citrate and sodium phosphate also increase ts solubility.

Incompatibility.—Spirit of nitrous ether, quinine salts, sal olatile. An aqueous solution of the acid gives a deep violet colour vith a trace of a persalt of iron.

Uses.—Anti-fermentative and anti-putrefactive. For various ebrile conditions generally as one of its salts, particularly for acute heumatism. See also Sodium Salicylate. In stomatitis a saturated queous solution is used. Large doses alone act as a direct poison n the heart and respiration. For sweating feet Pulvis Salicylicus um Talco is used. It is applied locally to corns, warts, and lupus.

A saturated aqueous solution as **Rectal Injection** has been used or dysentery of children.

To eradicate stumps left after removal of papillomatous growths to 6% solutions in spirit. It may also be used dissolved with odium sulphoricinate.—*q.v.*

For scarlatinal sore throats and tonsillitis, compresses of 2% Alcoholi Solution found of value. In gonorrhœa, may prove irritant, necessitatin periodical dropping and renewal.

Typhoid should be treated by 3 to 5 grain doses given with milk so as t be carried more quickly into the bowel.—A. Wilson, B.M.J. i./15,331.

To remove tattoo marks, mass Salicylic Acid with glycerin to a dough—apply over the marks with a compress and strips of adhesive plaster and allo to remain in contact for a week. After the first dressing the epidermis ove the marks is removed and a fresh application of the Salicylic paste applied Usually the second application removes.

Dermatitis may in some instances be caused by the external use of Salicyli Acid and its derivatives.—Y.B.P., '24, 341.

Septic wounds treated by hypertonic saline to which 2 to 3 drachms o saturated solution of Salicylic Acid in Alcohol is added to the pint—th crystals thrown out are deposited on the wound. Salicylic Gelatin 2 to 4% also used.—L. G. Anderson and co-workers.—L. i./16,1119.

Elixir Acidi Salicylici Compositum.

Dose.—1 to 2 drachms (**4 to 8 Cc.**) well diluted with water.

Each ounce represents Salicylic Acid 40 grains (as Sodium Salicylate), Gelsemium 8 grains, Cimicifuga 15 grains and Potassium Iodide 4 grains.

A proprietary preparation for use in chronic gout and rheumatism lumbago, and sciatica. It is antirheumatic, analgesic and the eliminative action of small doses of Potassium Iodide is useful.

Ⓟ**Emplastrum Acidi Salicylici Saponatum.** Salicylic Acid 2¼, 5 and 10% in Emplastrum Saponis.

Liquor Acidi Salicylici.

Boiling Distilled Water 1,000 parts, Salicylic Acid 1½ parts, a good antiseptic gargle. A useful solvent for alkaloidal and other salts; it is irritating to the eyes.

Lotio Acidi Salicylici cum Borace. Mid. H. Salicylic Acid 4, Borax 2, Glycerin 15, Alcohol 90% 15, Water to 140. For use in urticaria, prurigo and itching affections.

Pulvis Salicylicus cum Talco.

Salicylic Acid 3, Wheat Starch 10, Talc 87.

Mix to form a fine powder. For perspiration of the feet.

Ⓟ Salicylic Cream or Paste.

Salicylic Acid, in powder, 2, Carbolic Acid 1, Glycerin 10; mix. G.H. had Salicylic Acid 1, Glycerin 9.

Used as pigment when the skin is irritated by the discharge from wounds, &c., under antiseptic dressings.

Oleum Acidi Salicylici.

Scabs in eczema are well treated by Salicylic Acid dissolved in Castor Oil.—We suggest 1 in 50. This dissolves on warming.

Unguentum Acidi Salicylici (*B.P.* '14).

Salicylic Acid, in powder 1, White Paraffin Ointment 49. Useful in eczema, acne, ringworm and cancer.

In seborrhœa, the following is useful: Salicylic Acid 1, Precipitated Sulphur 2·5, Cold Cream 25.

Lupus vulgaris, scabies, acute eczematous dermatitis and ringworm treated by 50% Salicylic Acid Ointment.—Sir Archibald Reid, L. i./23,1325.

nguentum Acidi Salicylici Compositum. *Syn.* WHITFIELD'S OINTMENT.

Salicylic Acid 1, Benzoic Acid 1, Cocoa Nut Oil 12, Soft Paraffin 6. For ringworm.—L. i./17,222.

alicylic Gauze, Lint and Wool, each 4%.

Dissolve the Salicylic Acid in alcohol, *q.s.* (about 1=1 of dressing) nd impregnate under pressure: dry.

Salicylosol.—A solution of Salicylic Acid in a partly oxygenated ineral oil. Used by massage into the skin. When 10 Cc. of the solution as rubbed into the skin, 0·137 Gm. of Salicylic Acid appeared in the urine 24 hours. Hanzlik found that a normal person excreted 40% of a dose a Salicylate given *per os* in 24 hours. The absorption of Salicylic Acid om inunction is therefore only about one-third of the absorption of Salicyc Acid given *per os.*—B.M.J. i./22,233.

Iodinosol (T.M. 336541). A preparation containing 6 and 10% o odine in a base similar to Salicylosol for inunction.—B.M.J. i./22,233.

Capsules containing Iodinosol 6% 10 minims are made.

mmonii Salicylas U.S. $C_6H_4.OH.COO.NH_4=155{\cdot}08$.

Ph. Ned. V. with ½ H_2O.

Dose.—5 to 30 grains (**0·3 to 2 Gm.**). U.S.—*Average,* 15 grains.

In crystalline powder, very soluble in water.

erri Salicylas. *Syn.* FERRIC SALICYLATE. Composition varies.

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**).

Brownish powder, sparingly soluble in water, but readily in solution of Potassium Bicarbonate.

In tonsillitis as an antiarthritic tonic and as a dusting powder for oul wounds. Useful in erysipelas and acute tonsillitis in solution ormed by interaction of 7½ grains each of Sodium Salicylate and otassium Bicarbonate and 7½ minims of Ferric Chloride Solution .P. with diluent *q.s.*—M.C.S. Lawrence, Pr. March '13,633.

istura Ferri Salicylata. COHEN'S SALICYLATED IRON MIXTURE.

Dose.—1 to 2 drachms (**4 to 8 Cc.**) increased.

Dissolve citric acid 14 in distilled water 200, add ammonium carbonate 6·5, hen dissolve sodium salicylate 125 in this solution; add tincture of ferric hloride, 125, glycerin 175, and oil of betula 4, and then add sufficient distilled water to make 1,000, and filter.

The question has been asked: Do the Salicylates and kindred drugs stimuate or exhaust thyroid activity or do they actually neutralise it?

agnesii Salicylas. $(C_6H_4.OH.COO)_2Mg, 4H_2O=370{\cdot}464$.

Dose.—10 to 30 grains (**0·6 to 2·0 Gm.**).

Colourless crystals. *Soluble* 1 in 6 of water. Incompatible vith acids and Sodium Bicarbonate. It has been given in typhoid.

In flatulence 15 to 45 grains thrice daily has been found useful.

Potassii Salicylas. $C_6H_4.OH.COOK=176{\cdot}136$.

Dose.—5 to 30 grains (**0·3 to 2 Gm.**). A white crystalline powder, very soluble in water.

Has given relief in rheumatic affections of the eyes.

Sodii Salicylas (*B.P.* '14). U.S. X. $C_6H_4.OH.COONa=160{\cdot}037$.

Dose.—10 to 30 grains (**0·6 to 2 Gm.**) in a mixture or in achets. FR. CX.—*Max. single dose,* 30 grains. Max. during 24 ours, 180 grains approximately.

Intravenously, doses as large as 15 grains (**1 Gm.**) have been given, also in combination with the same amount of Sodium Iodide (*see* Injectio Sodii Salicylatis).

In white scales or shining tabular crystals (of sweetish taste). For varieties in commerce, compare Salicylic Acid.

Soluble in water 1 in 1. Concentrated solutions should be made with hot water and filtered. In alcohol 90% 1 in 6 by experiment.—W. H. M.

Incompatible with free ammonia, ammonium carbonate, and aromatic spirit of ammonia (turns brown). Mineral and many organic acids cause separation of salicylic acid, *e.g.*, to dispense Sodium Salicylate with Tincture of Perchloride of Iron, dissolve 1 drachm of the salt in 2 ounces of Water, add 30 to 40 minims of the Tincture and 1½ ounces of a solution of Potassium Bicarbonate 1 drachm in 1 ounce, then Chloroform Water to 8 ounces. The result is a clear palatable claret-colored mixture useful in rheumatic sore throats combined with anæmia.

In the case of a Sodium Salicylate, Tincture of Ferric Chloride and Sodium Bicarbonate mixture, a Sodium Ferryl-Salicylate is formed.—J. Rutherford Hill, P.J. i./26,358.

Flavoring.—Syl Lavandulæ, Glyl Pini; Syrupus Aromaticus (not so good as the former). Extractum Glycyrrhizæ Liquidum, Syrupus Zingiberis.

Germicidal Action. Almost nil. For effect as antirheumatic *vide* abstract *infra.*—R. Stockman, B.M.J. i./13,598. *For our experimental work see Vol. II.*

Uses.—Rheumatism, neuralgia, diarrhœa (of young children said to be almost specific), vertigo, Menière's disease, malarial fevers and diabetes may all be well treated by salicylates. In influenza and acute tonsillitis, 10 grains every three hours relieve the distressing symptoms. Puerperal fever, biliousness, acute pains of fibrositis, nephritis, cystitis, urticaria and Graves' disease have been well treated with it. By some it is considered the most powerful of hepatic stimulants. As a urinary antiseptic (*per os*) it has less action than Hexamine—about 50% of that given is excreted as Salicyluric Acid.

In sciatica the electro-negative salicyl ions may be driven into the tissues—*vide* Iontophoresis, *Vol. II.*

In acute rheumatism some advise very large doses, *e.g.*, 150 grains daily, with twice the amount of Sodium Bicarbonate or even *double* these amounts. Sodium Bicarbonate should always accompany it to prevent constipation.

Rectal injections of 8 Gm. in 150 Cc. with 1·5 Cc. Opium Tincture have been employed.

Stockman has shown that the fall of temperature under treatment with Salicylate and return of joints to the normal, varies within limits with the dose administered.

The COOH grouping *in* the Benzene ring in conjunction with the OH in the ortho- position seems to place Salicylic Acid at the highest point of efficacy of all anti-rheumatics; with 2COOH introduced, as in Phthalic Acid, efficacy vanishes. The Cresotinic Acids are the only bodies at all approaching Salicylic Acid in utility. It is not known definitely whether the Salicylates act as antitoxins or as antimicrobics. In acute rheumatism 90 to 160 grains or more in 24 hours act when infection is recent and when the inflammation is confined to joints, but when fibrous tissues of the heart valves or of the

nuscles *or* body generally are deeply implicated a more potent remedy is
vanted.—R. Stockman, B.M.J. i./13,598.

RHEUMATISM.—Salicylates not specific in every form of affection called
heumatic. The pyrexia of acute polyarticular rheumatism was generally
ontrolled within three days, but in the rheumatic state there was often a
yrexia ranging through two degrees, which continued even for weeks and
vas unaccompanied by any obvious manifestation of rheumatism. Such
yrexia was often uninfluenced by the Salicylates, though it might yield to
alol or Aspirin. The employment of the Salicylates in rheumatic hyper-
yrexia was waste of valuable time. The cutaneous manifestations of
heumatism were uninfluenced. Neither the various forms of erythema
urpura nor erythema nodosum appeared to be influenced and these mani-
estations had occurred while patients were actually taking the drug. The
ubcutaneous nodules, described by Barlow and Warner, were undoubtedly
heumatic in nature, but they were quite uninfluenced by the administration
f the Salicylates. The similarity of their structure to that of the inflamed
alves of the heart in rheumatism was a powerful argument against the
tility of the employment of Salicylates in endocarditis or pericarditis. The
anger of upsetting the stomach with the irritant Salicylates must be borne
n mind in the treatment of all heart affections, as also must the risk of
cidosis.—B.M.J. i./11,1177; L. i./11,1277.

Sodium Bicarbonate used with the Salicylate probably counteracts the
cid toxins (Formic Acid and probably also Acetic). 60 grains 10 times daily
f Salicylate were given to a boy of 16 who had an enormous crop of rheu-
natic nodules, about 250 in all, with pericarditis, endocarditis, dilated heart
nd moderate arthritis. The maximum amount of 600 grains of Salicylate
vith 1,200 grains of Bicarbonate was given for two days. After this 500
rains Salicylate with 1,000 of Bicarbonate for 6 days for 3 weeks—the
mount then gradually reduced. Every nodule disappeared, pericardial
riction vanished and heart became smaller. Left hospital with merely a
hort presystolic and short systolic murmur at the apex. Prevent con-
tipation and keep urine slightly alkaline.—D. Lees.

For the immediate treatment of rheumatic infection the Salicylates still
hold their place as the most efficacious of remedies at present known.—
G. A. Allen, Pres., Nov. '26,400.

Salicylates appeared best in preventing subsequent carditis developing,
next in order being Arsenic, sedatives giving rest only.—Mary Bertram,
B.M.J. i./25,496.

PRURITUS ANI. The itching may be instantly relieved by the application
of a very minute quantity of Sodium Salicylate.

In TYPHOID suggested to give 3 to 5 grains in intestinal capsules.

CHOREA believed to be always rheumatic, at least in part, therefore give
Sodium Salicylate lest fresh rheumatic manifestations develop, which might
thus be avoided. Smaller doses advocated than those of Lees (with Sodium
Bicarbonate). Before starting treatment bowels should be freely opened,
and before increasing dose evacuation should have taken place during pre-
ceding 12 hours. Chloretone as sedative sometimes useful in 3 to 5 grain
doses.—F. Langmead. R. Stockman does not believe in the Salicylic treat-
ment of chorea, but prefers Arsenic and nerve sedatives.

ANTI-DIARRHŒIC ACTION.—It was used in the war. Men going within
the hearing of big guns for the first time received 15 grain doses, preventing
the otherwise involuntary motion.

Sympathetic OPHTHALMIA treated with Sodium Salicylate: large doses—
one grain for each pound of body weight in the course of from 10 to 14 hours,
i.e., for patient of 140 pounds, seven doses of 20 grains are given at intervals
of an hour and a half.—Jl. A.M.A., Sept. 11/20,725, per Pres., Feb./21,74.

ENCEPHALITIS LETHARGICA treated by Sodium Salicylate, 15 to 30 grains
every 4 hours. When there is insomnia give 5 to 10 grains of Bromide and
Iodide of Potassium.—A. G. Gullan, B.M.J. i./25,1120.

Toxicity of Salicylates. Mean toxic dose for males of the synthetic
Sodium Salicylate was 180 grains, for females 140 grains; of the natural Salt
00 and 135 grains respectively; of Methyl Salicylate 120 minims alike for
males and females; of Aspirin 165 and 120 grains respectively. The doses
n arriving at these figures were given until symptoms of intoxication appeared.
—P. J. Hanzlik, L. i./13,1811; Jl. A.M.A., March 29, 1913.

Excretion of Salicylic Acid. About 20 Cc. of a 10% Sodium Salicylate solution given hourly until toxic symptoms appeared—*i.e.*, after an average of 13·8 Gm. of Salicylic Acid had been taken. Fluid was then taken regularly until salicylic acid disappeared from the urine. The total excretion (60%) in acute rheumatism was about 15% less than in normal persons (75%).—B.M.J. ii./17.296.

(A statement by Devrient, Arch. Exp. Path. Pharm., 1921,90, p. 242 (J.C.S.A. i. 21,909) is to the effect that not more than 15% of the acid administered is excreted in the urine.)

Salicyl reaction obtained from urine 27 hours after taking 2 Gm. of Sodium Salicylate. An investigation into the metabolism of Salicylic Acid resulted in the isolation of Salicyluric Acid from the urine and gave no evidence for the destruction of Salicylic Acid in the body.—E. G. Holmes, Jl. Ph. & Exp. Ther., Nov. '25,297—313.

Sodium Salicylate Tablets, 3 and 5 grains (**0·2 and 0·3 Gm.**).

Effervescent Sodium Salicylate. This is made in two strengths—5 and 10 grains in a drachm. *Dose.*—1 drachm (**4 Gm.**) or more.

* **'Vescettes' of Sodium Salicylate.** 5 grains. To be crushed and taken in a draught of warm water.

Injectio Sodii Salicylatis. *Dose.*—15 to 30 minims (**1 to 2 Cc.**). 1 in 20 of sterile water or weaker. Is injected at the seat of the pain in rheumatism.

If a little Salicylate is injected into an acutely inflamed rheumatic joint, the pain disappears and the patient is able to move his joint. This points to a specific action, since analgesia is central.—Dixon, p. 255.

Intravenously, 1 Gm. doses have been given in rheumatic affections. The stimulation is more rapid than in doses *per os.*

PSORIASIS.—In selected difficult cases, intravenous injections (10 Cc. of a 20% solution, three times weekly for 4 or 5 weeks) appear to be of definite value.—B.M.J.E. i./25,26.

TYPHUS FEVER treated with encouraging results by Sodium Salicylate intravenously, injections, frequently up to 5 and 6 Gm., being given daily. Myocarditis a contraindication.—Jl. Intrav. Therap., Jan. '26,20.

ENCEPHALITIS LETHARGICA well treated by Sodium Salicylate intravenously.—L. i./24,1011.

'Sterules' of Sodium Salicylate *for hæmorrhoids* contain 1 Cc. (15 minims) of 30% solution.

Hæmorrhoids treated by interstitial injection of this solution. Results as good as those obtained with Carbolic Acid (*vide* Hamamelis) but the pain immediately after the injection is more severe and lasts longer.—J. Dunbar, B.M.J. ii./23,809.

'Sterules' of Sodium Salicylate *for varicose veins* (Sicard and Paraf) contain *3 Cc.* of *20%*, *30%* or *40%* solution.

Varicose veins have been cured by injecting into them a 20% solution of Sodium Salicylate, followed by 30% solution a week later, and by 40% later on if necessary. Produces obliteration of vein and is not caustic or toxic: 100 cases cured.—Sir S. Alexander, L. ii./26,176. Of value, but complications frequent. Should be used with caution.—V. Meisen, L. ii./26,662.

V. Meisen now uses **Sodium Salicylate 25% and Sodium Chloride 10%,** which is practically painless. *Max. dose* 10 Cc. Cannula not too sharp is inserted with patient standing: rotate once or twice when blood flows from it to see that it has not caught in the opposite wall. The patient then lies down with leg on a special stand. When varices are empty commence injection very slowly, stopping if flow is resisted or if patient feels pain. For injections in the neighbourhood of the malleoli inject ½% Novocaine direct into the varix. Massage lightly after injection. Repeat the treatment every other day and if both legs are affected treat one every day. Reference is also made to Sicard and L. Humbert.—L. i./27,1355.

Sodium Salicylate injections (strictly intravenous) are safer in pregnancy and during menstrual period than Quinine-Urethane, commencing with 20 to 30% solutions, and passing on to 40%. 8 to 10 Cc. of the 20%, 5 Cc. of the 30%, or 3 to 4 Cc. of the 40%, is the customary dose at each sitting. It is important to work up to the maximum strength as soon as possible as the veins quickly accustom themselves to the injections. There are several disadvantages, including possible loss of time in testing sensitivity of the patient, acquirement of tolerance by veins if they are not quickly obliterated, cramp during administration, ulceration if leakage occurs, uncontrollable effect.—A. H. Douthwaite, "The Injection Treatment of Varicose Veins," H. K. Lewis, 1927.

It is unwise to give more than 5 Cc. of 40% solution at a time, though 10 Cc. of weaker dilution may be used initially.—W. S. C. Copeman, B.M.J. ii./26,614.

The 40% injection was found painful but the results were good. 1 Cc. of 20% Sodium Chloride should be injected into an inch length of a vein previously emptied and kept so for a minute after the injection. No local anæsthetic is needed, but if advised a ½% Novocain Solution.—B.M.J., ii./27,46.

See also Quinine-Urethane and Therapeutic Index.

Sterules, Intravenous, of Sodium Salicylate, 15 grains (1 Gm.) in 320 minims (20 Cc.), and combined **with Sodium Iodide,** 1 Gm.

This combination has been found of advantage in chronic arthritic affections.

According to Connor (Med. Rec. vol. 85, 323, 1914), Hall (Med. Times, May, 1920), and others, the relief of pain in rheumatic affections is more prompt by giving Sodium Salicylate intravenously than by giving it *per os*. Salicylates are of great benefit in acute arthritis and this affection has been thought to be a symptom of streptococcal infection. Salicylates are of less curative effect in so-called chronic arthritis. The latter is no doubt a mixed infection. Where the infection is of a chronic nature, only a transient analgesic effect is produced by Sodium Salicylate, but the best (more permanent) results are to be obtained by using Sodium Iodide in addition.

ACUTE SCIATICA. Effect sometimes dramatic—better than *per os*. —F. J. W. Porter, L. ii./25,1306.

Mistura Sodii Salicylatis.

Dose.—1 ounce (30 Cc.).

Sodium Salicylate 10 grains, Aromatic Spirit of Ammonia ½ drachm, Belladonna Tincture 5 minims, Chloroform Water to 1 ounce. For a common cold, every four hours.—Pr. Mar. 1911.

Sodium Di-Iodosalicylate, *Syn.,* **Diosal Solution,** 1 and 2% strength. A potent antiseptic, but not efficacious intravenously on local suppuration, as in wounds, but may be useful locally applied. It has however given relief in 3 Cc. doses intravenously in tuberculosis and rheumatic pains.—W. M. Crofton, L. i./23,893.

Oleum Gaultheriæ (*B.P.* '14). *Syn.* WINTERGREEN OIL.

Dose.—5 to 15 minims (0·3 to 1 Cc.).

The Distillate from *Gaultheria Procumbens, N.O. Ericaceæ*, and from the bark of *Betula Lenta* (*Betulaceæ*) are practically identical, ***cf.*** Methyl Salicylate. *Characters and Tests.*—Colourless liquid with strong characteristic odour and pungent taste. Sp. Gr. 1·180 to 1·187; O.R., 0° to—1°; R.I., 1·537 to 1·539; Soluble 1 volume in 6 of 70% Alcohol at 25° C. Should contain at least 99% Methyl Salicylate determined by the saponification process. Stimulant and diuretic.

Maceration for 12 to 24 hours of the leaves prior to distillation is necessary for the best yield, the oil being a "ferment" oil not pre-existing in the plant, but occurs as a non-odorous glucoside, which must be hydrolised by the ferment before distilling.

Capsules of Oil of Gaultheria—10 minims in each. *Dose.*—On three times a day or oftener.

The oil has similar properties to salicylic acid. 10 to 20 minims are given every 3 or 4 hours in rheumatism and sciatica. With olive oil externally for rheumatism.

Methyl Salicylas (*B.P.* '14). (98% pure). $C_6H_4.OH.COO.CH_3 = 152{\cdot}064$. Artificial (or Synthetic) Oil of Wintergreen.

U.S. X. gives Oleum Gaultheriæ and Oleum Betulæ from the bark of *B. lenta* (Sweet Birch) as synonymous with Methyl Salicylate.

A colourless liquid, with odour like above oil. ***Manufacture.***—May be prepared by carefully distilling a mixture of Salicylic Acid 2, Methyl Alcohol 2 and Sulphuric Acid 1. Sp. Gr. 1·185 to 1·192. ***Soluble*** in 90% alcohol, ether, chloroform or glacial acetic acid. Applied covered with impermeable tissue is quickly absorbed.

In local rheumatic pain the most efficient application.—R. Stockman, B.M.J. i./13,597. Also used for furunculous ulcers, orchitis, and mumps.

Bile secretion is increased by Methyl Salicylate *per os* without causing loss of body weight. Animal experiments.—P.J. ii./16,615.

Poisoning due to swallowing one ounce of Methyl Salicylate. Recovery after forcing liquids by the mouth, 2% solution Sodium Bicarbonate by proctoclysis, and wrapping patient with blankets.—Jl. A.M.A. ii./25,306.

* **Methysal Balm** (T.M. 303967).—*Martindale.* *Syn.* **Unguentum Methyl Salicylatis Compositum.**

Contains Methyl Salicylate 7, in combination with Menthol 5%. Also prepared containing 25% and 33% Methyl Salicylate (with Menthol 5%). For analgesic effect in rheumatism. Supplied in **Cellapsubes.**

It relieves pruritus and is suitable as an antiseptic Ointment. For muscular rheumatism of the limbs, which it cures (W.W.W.), it is best applied after fomenting the part with hot water.

Chloral Hydrate 1 to 5% has been suggested as an addition to reams of this kind. Oil of Cajuput is also used.

Linimentum Methyl Salicylatis, *Martindale.*

Methyl Salicylate 20, Menthol 10, Chloroform 10, Camphor 10, ucalyptus Oil 10, Turpentine Oil 10, Lavender Oil 5, Liquid Paraffin o 100. For use similar to the above.

Opium Tincture or Belladonna Liniment 10 to 20% may be added f required, but they do not mix with the Salicylate Liniment.

Preparations designated "**Betulol,**" "**Linimentum Betulæ ompositum,**" and **Baume Analgesique,** are supplied.

✱**Menthofax** (T.M. 405840).

A combination of analgesic, local-anæsthetic, and counter-irritant ubstances.

Balmosa. A non-greasy, analgesic cream, containing Methyl Salicylate nd rubefacients.

Unguentum Acidi Salicylici Terebinthinatum—Salicylic Acid 1, il of Turpentine 1, Lanolin 1.

The above are of value in rheumatic affections, applied to joints n lint covered with guttapercha tissue and flannel bandage.

thyl Salicylate. $C_6H_4.OH.COOC_2H_5$=166·085.

A colourless liquid of aromatic odour, with Sp. Gr. 1·13 and B.Pt. 25—234°, and properties similar to the Methyl compound. Soluble in lcohol.

utyl Salicylate. $C_6H_4.OH.COO.C_4H_9$ = 194·112. *Syn.* ✱Brunol T.M. 372226). An oily liquid with aromatic odour. Suggested or treatment of burns by means of lint washed with it and applied very 48 hours. Some Salicylate absorption has been observed. as been used in psoriasis and eczema.

myl Salicylate. $C_6H_4.OH.COO.C_5H_{11}$=208·128.

Substitute for Methyl Salicylate, with much less odour. For paint- ng on to rheumatic joints.

Capsules of Amyl Salicylate contain 3 minims (**0·2 Cc.**) for nternal medication.

Unguentum Amyl Salicylatis Compositum. *Syn.* '**Amysal.**'

Similar to Methysal Balm *q.v.* but made with Amyl Salicylate. dour more pleasant.

Borneol Salicylate. *Syn.* ✱**Salit** (T.M. 258851). In muscular rheu- natism and acute neuralgia, by inunction or by painting over affected part. pply ½ to 1 drachm, with equal quantity of olive oil.

alicyl Salicylate. *Syn.* ✱ **Diplosal** (T.M. 303704.)
$OH.C_6H_4.COO.C_6H_4.COOH$=258·08.

Dose.—15 grains (**1 Gm.**) in cachet or tablets.

Salol in which the phenyl group is replaced by Salicylic Acid. White dourless needles melting at 147° C. Insoluble in water and dilute acids, oluble in alcohol. Used for rheumatism, neuralgia, and cystitis.

Pharmacological experiments showed that the compound remained un- hanged for 6 hours in the gastric juice, but was decomposed in 2 or 3 minutes n the duodenal secretion. Hence it does not cause gastric disturbances in herapeutic doses.

'**Trichlorophenyl-Iodomethyl-Salicyl,**' described as 'T.C.P.' A non- oisonous liquid preparation for local use to wounds and burns, in nasal atarrh, pyorrhœa and skin affections, for relief from the pain of bites and tings, and as a preventive against influenza and malaria. It is also used s a remedy for chilblains, piles and as a general antiseptic application.

Acidum Acetyl-Salicylicum (*B.P.* '14). *Syn.* **Aspirin.** Fr. Cx., P.G. VI., P. Helv., P. Dan., Ph. Ital. IV., U.S. X., P. Svec. X.

$CH_3CO.O.C_6H_4COOH = 180{\cdot}064$.

The Name Aspirin* is now *public property.

For details of removal ('avoidance') of the Trade Mark from the British Register, and from the U.S. Patent Office, see Edn. XVIII.

The following Associated Trade Marks are still on the British Register :—* Novaspirin, 322552; * Aspirinoids, 322524. The words Novaspirinoids and Diaspirin are no longer T.M's.

Acetosal, Acetysal, *Aspirgran (T.M. 457720), ***Aspro** (T.M. 405787), *** Empirin** (T.M. 364114), ***Genasprin** (T.M. 380162), **Helicon, Salacetin, * Salaspin** (T.M. 363715), and **Saletin,** are further names for the substance.

Patents.—Nos. 27088 of 1898 and 9123 of 1899. Riedel's Patent is No. 11596/97. All these are now void.

For judgment in Patent case in this country see P.J. ii./'05,76; ii./'07,724.

Dose.—5 to 15 grains (0·3 to 1 Gm.), in cachets or suspended in a good draught of water thrice daily after meals—not on an empty stomach. Children ½ to 5 grains (0·03 to 0·3 Gm.). Ph. Ital. has 5 Gm. as max. dose in 24 hours.

Manufacture.—By action of acetic anhydride on Salicylic Acid. Salicylic Acid 50 and Acetic Anhydride 75 are heated to 150° C. for two hours under a reflux condenser. On cooling, the crystals are pressed out and recrystallised from dry Chloroform. Alternatively Salicylic Acid 25 and Acetyl Chloride 20 are heated under a reflux condenser to 80° C. for some hours. Excess of Acetyl Chloride is removed on the water bath and the product recrystallised from dry Chloroform, Benzene or Carbon Tetrachloride. *Consult also Patents above referred to.*

N. Evers, 'Chemistry of Drugs,' 1926, has data of large-scale production.

Characters.—A white powder, M. Pt. 133 to 135° C. (the latter in preference). It is not an absolutely stable body—all samples have more or less odour of Acetic Acid. *Soluble* about 1 in 400 of water. 1 in 5 alcohol 90%. Incomplete solubility is caused sometimes by the use of benzene as recrystallising medium.—Prof. H. Llewellyn Smith.—P.J. i./15,200.

Aspirin passes (in great measure) unchanged through the stomach, decomposing to a great extent on reaching the alkaline intestinal juices (see work of Stockman, *infra*). ***Incompatible*** with free acids, iron salts and alkalis. It forms a clear mixture with Sodium Bicarbonate, owing to formation of Acetate and Salicylate of Sodium, and is not intended to be thus prescribed. Heating the acid in presence of moisture also causes dissociation.

Ferric Chloride added to Solution produces no violet colour; distinction from and absence of Salicylic Acid. For further details see Vol. II.

Uses.—Has anti-rheumatic properties, and is used as a substitute for Salicylic Acid and its salts. Does not irritate the mucous membrane of the stomach, and is to be preferred in heart and ear complaints. Is useful in influenza (especially with Quinine), acute and chronic affections of the joints, headaches, and in gout, neuralgia, chorea, and pleurisy. Has been used in hay fever, diabetes and dysmenorrhœa. The gradual hydrolysis of the substance in the body is said to prevent the cumulative toxic action of the Salicylic Acid. It relieves the pain of cancer and of cystitis.

In influenzal complaints a few doses during the day will often induce perspiration, quiet sleep follows, fever is reduced and pulse improves.

In some cases, it is useful with Caffeine, *e.g.*, Aspirin 7½ grains with Caffeine 3 grains.

Physiological Action.—Our experiments have shewn that in passing through the stomach Aspirin splits up to an extent not exceeding 5% of the amount taken, the bulk of the acid being absorbed as salicylate in the intestines after hydrolysis.

Prof. H. Llewellyn Smith has gone over similar ground with numerous samples and confirms our results.—P.J. i./15,200.

Elimination of Salicylic Acid and of unchanged Aspirin. A paper by P. J. Hanzlik and E. Presho in the Journal of Pharmacology and Experimental Therapeutics, May 1923, embodying some results obtained *in vitro* and an investigation of the urine of 6 patients, 4 of them being convalescents and the remaining 2 suffering with rheumatic fever, is apparently written to upset existing beliefs as to the fate of Aspirin in passing through the system. So far as the *in vitro* experiments go, the results confirm our own investigations which have been published for some years, *i.e.*, the amount of decomposition depends on the time in solution at body temperature.

With regard to the clinical results, the total of Salicylic Acid and unchanged Aspirin, which was found to have been passed, varied considerably in the various cases, for example in one case, 68·5% of the total Salicylic Acid and Aspirin was excreted, while in another case only 27% was excreted. It should also be made clear that the dosage was heroic and, intentionally, bordering on the toxic. The paper says that with ordinary doses, ½ to 1 gram of Aspirin, no data are at hand, but that with doses of this magnitude the mean excretion of total Salicylic Acid in 3 normal individuals was about 60%.

The main point of the paper appears to be that in the 6 persons already referred to, *receiving toxic doses* of Aspirin, there was a total excretion of unchanged Aspirin ranging from 8·8% to 36·6% of the Aspirin taken, and, broadly speaking, that a considerable amount of unchanged Aspirin would circulate through the body in such cases. The investigation is of interest but the conditions do not seem to be in agreement with ordinary therapeutic developments.

For *further details, also for* ***Bactericidal Action,*** *vide* Vol. II.

Potassium Citrate with Aspirin.

Aspirin in presence of Potassium Citrate has its solubility in water markedly increased. In some experiments conducted by us in June, 1927, equimolecular proportions of Aspirin and Potassium Citrate (180·1 and 324·4 respectively) were powdered together and found to be permanent and showed no evidence of decomposition after 5 months in a stoppered bottle.

This powder was soluble to the extent of at least 1 in 7½, *i.e.*, 1 in 19 of actual Aspirin.

Although there is no chemical reaction between the two compounds, it could be suggested that in solution the Potassium Citrate is hydrolised, giving the Potassium Acid Citrate and the soluble Potassium Acetyl-Salicylate.

The practical upshot is that to make Aspirin soluble approx. 1 *in* 20 *it is necessary to prescribe nearly twice the amount of Potassium Citrate with it.*

There may be a notable difference in physiological effect, as apart from the independent action of the Potassium Citrate the speed and even the locus of absorption in the system may give enhanced effect. A larger proportion may perhaps be absorbed in the stomach, and in consequence less would be carried forward to the duodenum, where Aspirin alone is thought to be assimilated—*cf.* B.M.J. i./27,908.

Mistura Aspirin. *Syn.* MISTURA ACIDI ACETYL-SALICYLICI. *Dose.*—½ ounce=10 grains. Acetyl-Salicylic Acid in fine powder 10 grains, Tragacanth Mucilage 90 minims, Chloroform Water to ½ ounce.

Tablets are prepared weighing 5 grains (**0·3 Gm.**), and 8 grains (**0·5 Gm.**). These should *not be swallowed whole.*

Also **Tablets of Acetyl-Salicylic Acid** 5 grains **with Phenacetin** 2½ grains each and $\boxed{\mathfrak{P}1}$ $\boxed{\mathfrak{D}}$ **with Dover's Powder** 2½ grains. If made **with Lactose** 5 grains in addition these are Ⓟ *but outside* $\boxed{\mathfrak{D}}$. Prescribers should specify "*Form* 2."

Acute febrile diseases—measles, pneumonia, diphtheria and sepsis generally—treated by the following combined: Aspirin 10 grains, Phenacetin 5 grains, Compound Ipecacuanha Powder 15 grains, with striking effects. Inflammation reduced at site of origin, with sweating and fall of temperature.—R. J. G. Parnell and co-workers, B.M.J. ii./22,1000. The combination is highly spoken of by others; valuable during the paroxysms of malaria. *ibid.*, p. 1097. *See also* L. ii./23,1422.

Dover's Powder, it is stated, should not be compounded with Aspirin, as in cases susceptible to Opium it retards the action of Aspirin and causes serious danger.—T. M. Allison, L, i./26,1280.

Pulvis Aspirin Compositus, *vel* "PULV. A.P.C."—VIC. PARK.

Aspirin 5 grains, Phenacetin 4 grains, Caffeine Citrate 3 grains.

Aspirin and Phenoquin—combined powders 7½ grains each, followed in the morning by a brisk Saline aperient, useful. Better than Aspirin alone in producing a profuse perspiration.—N.Y.M.Jl., Mar./20, 459, per Pres., Feb./21,85.

Aspirin Tablets made with 1½ molecules of Sodium Bicarbonate to 1 molecule of Acid subject of a Patent.—P.J. i./13,768.

Elixir Sodii Brom-Acetosalicylatis.

Dose—½ ounce repeated each hour if necessary until 4 doses have been taken. Contains the equivalent of 10 grains of Acetyl-Salicylic Acid and 10 grains of Sodium Bromide in 1 ounce.

Antipyretic. Relieves chronic articular rheumatism, and may be tried for vague neuralgic pain.—W. W. W.

$\boxed{\mathfrak{P}1}$**Pilula Aspirin et Acidi Arseniosi (Hoedemaker's Pill).**—Vic. Park.

Aspirin 2½ drachms, Arsenious Anhydride 1/6 grain, Starch and Distilled Water sufficient to make into 100 pills. *Dose.*—2 pills thrice daily, increasing carefully by one pill every second day to a maximum, continued for a period, of never more than 25 pills daily, and then reducing at the same rate and never suddenly.

References to Aspirin.

Glycosuria is occasionally reduced by it.—W. Hale White, L. i./14,372.

ASTHMA. Some cases relieved by Aspirin. In others it is quite unsuited.—B.M.J.E. ii./22,33.

After TONSILLECTOMY an **Aspirin 'Throat Bath,'** 10 grains floating on a half tumbler of water, held in the throat first one side and then the other, is soothing.—R. S. Stevenson, L. ii./25,1332.

SOPORIFIC EFFECT.—Aspirin often has this, probably by causing a dilatation of peripheral vessels.—'Insomnia,' E. M. Callender, L.ii/27,1282, 1294.

Toxic Effects.

May occasionally cause gastric pain, vomiting and giddiness; œdema of face and skin rash.

RHEUMATIC PAINS IN THE ARM. 15 grains in three 5 grain doses during 4 to 5 hours. Within 20 minutes of the third dose marked œdema of the eyelids, forehead and cheeks suddenly developed. The œdema did not disappear until the third day, and rheumatic pain ceased. Another patient experienced similar effect—5 grains caused puffiness of the eyelids.—P. H. Abercrombie, B.M.J. i./11,1314.

Cyanosis and rash after 10 grains of Aspirin—special idiosyncrasy.—W. A. E. Karunaratne.—B.M.J.ii./19, 42.

Patients with low blood pressure and nasal polypi cannot take Aspirin. Phenacetin is usually safe.—A. Francis, *ibid.* 204, ***see*** also *ibid.* 560 and 694.

Synthetic Acetyl-Salicylic Acid is apt to contain Ortho-Creosotic Acid as well as free Salicylic Acid.—Hastings W. Molloy, M.P.C., Nov. 22/22,429.

As a drug crave Aspirin may develop in the future.—Prof. Wild, L.ii./20,35.

485 grains of Aspirin taken in tablet form in one dose. Vomited copiously. Quick recovery—no active treatment adopted.—J. H. Robinson, L. ii./26,256.

For further references see previous Edns.

Calcii Aceto-salicylas. *Syn.* ✱ **Tylcalsin** (T.M. 337714). *Martindale.*—$(CH_3CO.O.C_6H_4.COO)_2Ca\ (+2H_2O)=434{\cdot}214$.

✱ **Kalmopyrin** (T.M. 348371) has the same composition.

White amorphous, non-hygroscopic powder.

Dose.—5 to 15 grains (**0·3 to 1·0 Gm.**). May be dissolved in a little water at the time of taking.

Solubility.—The compound is soluble in water 1 in 6, but it is liable to dissociation in this form. It is preferably given in tablet, crushed at the time of taking, in water or as a cachet, followed by a draught of water.

Exposure to excessive temperatures.—It is important to note that Tylcalsin should not be subjected to heat, especially in association with moisture. Decomposition commences between 50° and 60° C., but even this should be avoided.—W.H.M., Oct./1921.

Incompatible with mineral acids and as other Lime Salts. Prescription in mixture form is *not advised.*

Tablets and **Cachets** 8 grains (**0·5 Gm.**) each are preferable.

Uses.—In view of its greater solubility, Tylcalsin forms a useful substitute for Aspirin (compare note under Aspirin by Graham Chambers, Vol. II., from which it is evident that soluble medicaments pass rapidly into the intestine and are there absorbed).

It hydrolyses slightly in solution—less than the Lithium Salt, but is rapidly split up on boiling in solution.

(Special attention is drawn to the *intravenous* use of Tylcalsin *infra.*)

A prompt remedy as an anti-rheumatic and influenza specific, in catarrhs and neuralgia, and for relief of pain. The response in these affections is excellent. It combines the good qualities both of Sodium Salicylate and Aspirin. No by-effects are produced on the heart, etc. It is well tolerated and has never been known to produce vomiting. A useful analgesic, veritably specific, for chronic rheumatic pains of the limbs. May be tried in obstinate diarrhœa.

Antipyretic action occurs in about an hour, with drop of temperature of 0·4 to 0·8° C.—the fall being maintained for 2 to 2½ hours, then give further dose—for rheumatic gout pain. As analgesic one tablet is often sufficient, two may be given if heart action normal.

In lumbago 2 tablets at night in hot tea (as diaphoretic) valuable.

In gonorrhœal rheumatism, Tylcalsin has given excellent results.

It does not cause pharyngeal or gastric pain like the free acid and it occasions less renal irritation.—P.J. i./17,419.

ASTHMA well treated by Tylcalsin, ten grains three or four times a day. Calcium Lactate used for children.—A. M. Bremner, B.M.J. ii./22,666.

DENGUE has been well treated by Tylcalsin. In some cases relief commenced in half an hour.—R. B. Billimoria.

SEPTIC THROAT (Staphylo. and Streptococcal) treated with success with Tylcalsin internally and Tinctura Ananassæ locally. In less than 24 hours the symptoms had completely disappeared. Tylcalsin acted well in checking the incubation of the Cocci and reducing temperature rapidly.—Craik Taylor.

Tylcalsin 5 grains, Quinine Salicylate 1 grain, Salol 5 grains, and Phenalgin 10 grains, as a combined powder, has been found most efficient in neuritis and neuralgia.

Granular Effervescent Tylcalsin contains 5 grains in the drachm. *Dose.*—1 to 3 drachms.

TYLCALSIN ADMINISTERED INTRAVENOUSLY.

To relieve rheumatic and other types of pain, the use of Tylcalsin intravenously was suggested by A. Cambell (M.O. i/c. Roy. Portsmouth Hosp.), B.M.J., ii./21,37. See also W. H. Martindale, *ibid.*, 774.

Dose.—The usual dose is 0·5 to 1 Gm. in 10 to 20 Cc. of water, but larger doses, even 2 Gm., have been administered. The concentration is of importance; it should not exceed 5%.

Technique.—The contents of one Sterule are dissolved in 10 Cc. of previously boiled and cooled water, and injected *very slowly.* Solutions of Tylcalsin must not be heated.

Tylcalsin Sterules (containing the dry powder unaffected by atmospheric moisture) are prepared containing **0·5** and **1 Gm.**

Tylcalsin is a delicate compound liable to hydrolysis on keeping. If there is evidence of marked acetous odour or a ‘ puff ’ on snapping off the sterule, the chemical is unsuited for use.

The method has been successful in a diversity of painful affections where other remedies have failed. Success, for example, has been obtained in sciatica, acute rheumatism, tabes dorsalis, interstitial keratitis, acute iritis, gonorrhœal synovitis, dysmenorrhœa and severe headaches of doubtful causation.

A case of psoriasis of 15 years standing was treated by the method, we are informed privately, with “ marvellous ” result. The affection cleared up completely.

The procedure is well worthy of trial in obstinate influenza cases.

In rheumatic endocarditis, we have been told, there is nothing equal to it. ¼-Gm. doses intravenously have been given to children of 14.

Tylcalsin, useful intravenously in acute and subacute rheumatism, septicæmia.—H. Pritchard, B.M.J., i./27,794.

Lithii Aceto-Salicylas $CH_3CO.O.C_6H_4COOLi$ = 185·996. *Syn.* * **Tyllithin** (T.M. 337715). HYDROPYRIN is a similar compound.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**). Maximum daily dose 75 grains (**5 Gm.**).

White powder with bitter taste. ***Soluble*** 1 in 1 (by experiment) in Water, 1 in 4 Alcohol, insoluble in Ether. The salt is to be kept in a well closed bottle as it is slightly hygroscopic and undergoes decomposition in moist air.

Uses.—Analogous to those of the Calcium Salt (*antea*).

Both, by reason of their greater solubility, should possess advantage in prompt action over Aspirin.

Incompatible with Iron Salts, Mineral Acids and Alkalies.

It is preferably given as **Tyllithin Tablets** or **Cachets,** 8 grains (**0·5 Gm.**) in each. It is *not desirable* to give it in mixture form.

Granular Effervescent Tyllithin contains 5 grains in the drachm.

Dose.—1 to 3 drachms.

Enema Sedativum St.G.H.

Lithium Aceto-Salicylate 10 grains, Sodium Bromide 1 drachm, Distilled Water to 5 ounces.

To be mixed with equal quantity of warm water and given immediately after operation.

Magnesii Aceto-Salicylas. *Syn.* * **Magisal** (T.M. 413697), *Martindale.* $(CH_3CO.O.C_6H_4.COO)_2Mg.$=382·432.

Dose.—5 to 15 grains (**0·3 to 1·0 Gm.**).

Microcrystalline powder, non-hygroscopic, almost tasteless and odourless, soluble 1 in 12 of water, less readily in spirit.

Incompatible with Iron Salts, Mineral Acids and Alkalis and otherwise as Aspirin Compounds.

Uses.—This is an interesting, relatively stable, Acetosalicylate whice may be tried as an alternative to the other salts and the acid.

PANNICULITIS.—If pain is severe or interferes with treatment, a cachet containing Magisal, Pyramidon and Caffeine Citrate may be given occasionally, otherwise drug treatment, apart from a digestive aid, is of doubtful value.—W. Bain, B.M.J., i./25,450.

* **Magisal Tablets** 5 grains (**0·3 Gm.**).

Dose.—One to three tablets as required.

Sodii Aceto-Salicylas, $CH_3CO.O.C_6H_4COO.Na$=202·053. *Syn.* * **Tylnatrin** (T.M. 337716), *Martindale.*

Dose.—5 to 15 grains (**0·3 to 1 Gm.**).

White amorphous hygroscopic powder, very soluble in water.

Uses.—Similar to Tylcalsin. Has also been given intravenously, but Tylcalsin is preferable.

Saligenin.—$C_6H_4CH_2OH.OH$=124·064.

Dose.—10 grains (**0·6 Gm.**).

Chemically this is the Alcohol of which Salicylic Acid is the corresponding acid. It is converted into the acid in the body.

Saligenin is formed with Glucose on the hydrolysis of Salicin.—P.J., i./27,622. In acute rheumatism it is well spoken of by R. Stockman,—the above dose every two hours. Action rapid. Pain in joints ceased in 12 hours and temperature normal in 36 hours. In another case the fibrous tissue was widely affected and 1,340 grains had to be given. It caused a good deal of perspiration, and two cases suffered from deafness.—B.M.J. i./13,598.

Saligenin has local anæsthetic properties—the best of the phenyl carbinols. Much less toxic than Cocaine or Novocain, and anæsthesia lasts quite as long. Minor operations under 2% solution. 4% solution useful in work on the female urethra and bladder.—J. Pharm. & Exp. Ther., June, '20, p. 261. J.A.M.A., Dec. 25, 1920, p. 1770, per Pres., Feb. '21, p. 41.

Acetyl-methyl-Salicylate. *Syn.* SALACETOL.
$C_6H_4(OH).COO.CH_2CO.CH_3=194·08$.

Dose.—10 to 30 grains (**0·6 to 2 Gm.**) in cachets or suspended.

Manufacture.—By heating Sodium Salicylate with Monochlor-Acetone in equimolecular proportions, in shining crystals very slightly soluble in water, in alcohol 90% 1 in 14 easily. Caustic alkalis decompose it, forming salicylates.

Used in rheumatism. For diarrhœa best given in Castor Oil (if required) —before breakfast.

Salicinum (*B.P.* '14). U.S. $C_6H_{11}O_5.O.C_6H_4.CH_2OH=286·144$.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**) in aqueous solution, taste may be covered with liquid extract of liquorice, or small dose in a pill with glycerin of tragacanth.

A glucoside in colourless shining trimetric tabular crystals, without odour, taste moderately bitter. ***Soluble*** 1 in 28 parts of cold water, less in alcohol, but not soluble in ether. Obtained commercially from *Salix fragilis* or *S. purpurea* and other species of willow. M.pt. 200° C.

Flavoring.—Syl Rosæ, Glyl Cinnamomi; Syrupus Aurantii, Elixir Saccharini.

Uses.—In small doses, often combined with valerianates and compound rhubarb pill, is a mild tonic. It is stated to cure influenza more rapidly than any other treatment, and to act as a prophylactic. In acute rheumatism, large doses are specific. It is given to reduce fevers, *e.g.*, of malaria or phthisis. Is of value in psoriasis and in syphilis where Mercury is not tolerated. It is not adapted for use as an external antiseptic.

Effervescent Salicin.

Dose.—1 drachm. Contains 5 grains in 1 drachm.

Tablets, 5 grains of Salicin (**0·3 Gm.**). *Dose.*—1 to 4.

Its action depends on production of Salicylic Acid in the blood. In rheumatic fever it is highly satisfactory. 20 grain doses hourly or 30 grains every 2 or 3 hours. 60 grains have been given, repeated in 2 hours without ill effect.—R. Stockman.

In LUPUS ERYTHEMATOSUS with good results, 15 grains 3 times a day with saline aperient.—J. M. H. MacLeod, B.M.J. ii./13,313.

INFLUENZA.—Salicin, large doses effectual; 20 grains every hour for 12 hours followed by 20 grains every 2 hours for the next 12; also removes infectivity of patient.—E. B. Turner, B.M.J. ii./18,112; i./19,278.

Its value in Influenza—from 1889-1927.—E. B. Turner, B.M.J., ii/27, 93; see also J. Craig, *ibid.* 237.

PSORIASIS.—Salicin, 10—15 grains three times a day a valuable drug in acute and spreading cases.—B.M.A. Ann. Meeting, '26, L. ii./26,550. *See also* G. Pernet, Arch. Derm. Syph., Jan. '26,111.

Iodo-Salicin, $C_{13}H_{17}IO_7+2H_2O$.

This compound, the author suggests, may prove a valuable anti-rheumatic and anti-influenza remedy. Experiments were in process on the subject at the time of going to press. No data as to dosage are as yet available.

Salol (*B.P.*'14) U.S. X., P.G. VI. **Phenyl Salicylate** $C_6H_4.OH.COO.C_6H_5$ =214·08.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**) in cachets or suspended in milk. Fr. Cx. : *Max. single dose,* 15 grains. Max. during 24 hours, 90 grains.

Small crystals, with a slight wintergreen odour.

Tablets, 5 grains (**0·3 Gm.**). *Dose.*—1 to 3. **Pills** contain 2½ grains. **Capsules** contain 5 and 10 grains (**0·3 and 0·6 Gm.**).

Soluble 1 in 10 or more of alcohol, 1 in 12 of liquid paraffin, in fixed oils, and a trace in glycerin. Almost insoluble in water.

Dispensing Note.—When prescribed in an emulsion with an oil, *e.g.* Castor Oil, dissolve it in the oil before proceeding. Melt the Salol and the oil in a warmed mortar (salol melts about 42 to 43° C.); emulsify with tragacanth, using hot water to complete.

In the case of the following prescription, Salol 10 grains, Castor Oil 5 minims, Tragacanth Powder *q.s.*, Glycerin 10 minims and Water to one ounce, it is well to use Saponin. Place the Castor Oil, Salol and Glycerin in a mortar with half a grain of Saponin; triturate well together, then add gradually with continuous stirring half an ounce of mucilage of Tragacanth, and, finally, the requisite quantity of water. This method produces a fine, white non-separating emulsion.—A correspondent C.D., Sept. 9, 1922.

Flavoring.—Glyl Lavandulæ, Glyl Pini; Elixir Aromaticus, Syrupus Aurantii Floris.

Uses.—Antiseptic and antipyretic. In the small intestine it splits up into its component parts, both being found in the urine, which is rendered aseptic and becomes very dark. Used with success for rheumatism, acute and chronic, for sciatica, dysentery, and typhoid fever, gonorrhœa and vesical catarrh and diabetes. The dose is limited by its *phenol* content.—R. Stockman.

In all forms of sore throat; relieves earache and ocular neuralgia, and of value for summer diarrhœa, especially of children. Must not be given in renal disease.

In acute infection of the urinary tract and efficacious in infections due to colon bacillus. Total dose: 40 to 45 grains in 24 hours, given in 7½ grain cachets with a warm drink, or at meal times.—B.M.J.E. i./27,12.

In diagnosis of fermentative Indigestion :—

The time taken for the food to leave the stomach may be found by giving 15 grains of Salol. This does not undergo decomposition in acid, but in an alkaline medium is split up into constituents, phenol and salicylic acid. The presence of the latter is readily found in the urine by adding a little neutral Ferric Chloride solution. One may expect to find it normally in from 45 *to* 75 *minutes after Salol is taken.*—B.M.J. i./11,665.

Cachets of Salol, Bismuth Carbonate and **Sodium Bicarbonate,** 5 grains each are useful as intestinal antiseptic.

Salol Mouth Wash.

Salol 2·5, Saccharin 0·004, Peppermint Oil 0·5, Clove and Caraway Oil of each 0·1, in Alcohol 80%, to 100. *For use* dilute in proportion ½ to 1 teaspoonful to the ½ pint of warm water.

Emulsio Salol. *Dose.*—½ to 1 ounce.

Salol 20 grains, Compound Tragacanth Powder 20 grains, Distilled Water *q.s.* to 1 ounce.

CHOLERA.—During the algide stage the following mixtures have been used:—Salol 10 grains, Mucilage 1 drachm, Spirit of Chloroform 15 minims, Water 1 ounce—every 2 hours until reaction sets in—then Sodium Bicarbonate 10 grains, Spirit of Chloroform 20 minims, Sweet Spirits of Nitre 20 minims, Water to 2 drachms, every four hours till urinary secretion is established and normal. Cox combines with this 2 or 3 quart intravenous injections of warm Sodium Chloride Solution (100 grains to the quart). This injection is made by gravity (2 or 3 feet head of water), and may be repeated.—Brooke.

Salol in dusting powders, tooth powders, lotions, pomades, etc., is held by some possibly to produce eczematous skin eruptions. Small particles of Salol, *e.g.*, in a tooth powder may be more irritant than a solution would be.—P.R. Oct. 1913; P.J. ii./13,602.

Salol Coating of Pills is conducted by employing Salol *melted.*

This renders the pill insoluble in the acid gastric juice, but soluble in the alkaline fluid of the intestine; hence suitable for purgatives to act on the bowels, and for administering antiseptic remedies in cases of eczema and urticaria, when these are caused by intoxication from ptomaines in the intestinal canal—*cf.* **Pilulæ.**

Collodium Salol. Salol 4, Ether 4, Collodion 30. Gives rapid relief in pain of acute rheumatism.

Pigmentum Salol. **Mid. H., 1927.**
Salol 1, Glycerin 4, Alcohol (90%) 15.

Salol Catheter Oil. Salol 1, Castor Oil and Almond Oil, of each 15. Does not dissolve the varnish of catheters (G. Buckston Browne).

Salol cum Camphora, Salol Camphor.

Salol 3, Camphor 2, heated together, combine to form a viscid liquid, which has been used as an antiseptic in place of iodoform. Prepared with 10% only of camphor, quickly crystallizes, and when powdered is suitable for application, where liquid not practicable.

Useful in suppuration of the middle ear; non-irritating.

Liquefaction of mixtures of salol with other substances.—Am. Jl. Ph. May, 1910, 241.

𝔇 P 1 **Unguentum Salol cum Cocaina.**

Salol 2, Cocaine Hydrochloride 1, Ceratum Petrolei 16. Useful for burns.

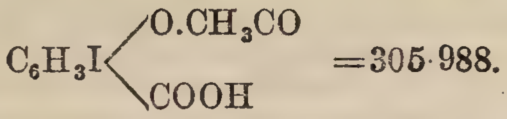
Unguentum Salol cum Menthol.

Salol 4, Menthol 2, Olive Oil 4, Anhydrous Lanolin to 100. For fissures of the skin, *e.g.*, in chapped hands.

Phenyl-Acetyl Salicylate. *Syn.* VESIPYRINE, ACETYL-SALOL, PHENYL-ASPIRIN $C_6H_4.O.CH_3CO.COO.C_6H_5=256{\cdot}096$.

Dose.—15 grains (1 Gm.) thrice daily. Much larger doses have been given. Crystals insoluble in water. Soluble in alcohol. Uses as for salol and salicylates. Breaks up in the intestine into salol and acetic acid.—F.N., 1909.

★**Aspriodine** (T.M. No. 435198). *Syn.* Acetyl-Iodo-Salicylic Acid.



$$C_6H_3I\begin{cases}O.CH_3CO\\COOH\end{cases}=305\cdot988.$$

Dose.—5 grains (**0·3 Gm.**) per diem after food, increased if required. To be given *alone* in tablet (crushed) or in cachet or slipule (No. 1), followed by a little water.

Chemical Composition.—Aspriodine is a definite compound containing 41·47% *Iodine*, the balance (58·53%) being the *Aspirin* radical. It is stable at ordinary atmospheric temperatures. It has M.pt. 154°.

Soluble in Alcohol 90% 1 in 16·5, Ether 1 in 22, Chloroform 1 in 57, very slightly in Water (1 in 5,500).

Potassium Citrate with Aspriodine.

Working on lines similar to the experiments with **Aspirin** (*q.v.*), we found ncreased solubility, but the solution is not permanent nor does additional Potassium Citrate improve the solubility.

Incompatible with Alkalis. It is preferably administered alone.

Pharmacology.—Aspriodine embodies the properties of Iodides on the one hand and Aspirin on the other. It is not affected by physiological acid, but it is readily split up by the alkalinity of the intestinal digestive tract.

Evidence of liberation of Iodine in the body. Examinations of he urine after taking, for example, 10 grain doses of Aspriodine by the mouth have shown that the Iodine is promptly liberated in the system—within an hour. The Iodine in these instances is associated with inorganic bases, Sodium or Potassium. The result is of peculiar interest, because Iodine n the Benzene ring of an aromatic compound is generally strongly held and difficult to remove chemically as, for example, by simply treating it with an aqueous solution of an alkali. We repeat there is therefore distinct evidence that the compound is dissociated, possibly in part by enzyme action, in the alkaline portion of the duodenum.

Method Employed in Testing the Urine. Possible confusion with Iodine n the organic condition was excluded by treating the specimens with Ether after acidifying to remove any compound of the nature of Iodo-Salicylic Acid, which, it is assumed, would be formed in the first stage of dissociation. The procedure employed was to acidify a small amount, *e.g.*, 30 Cc., of the urine from the total output and extract it with Ether, as stated, by repeated shaking, then to render alkaline with Caustic Soda, evaporate to dryness and incinerate. The residue was dissolved in 10 Cc. of water and, after filtering, a small quantity of Sodium Nitrite and Sulphuric Acid were added n the presence of a little Chloroform. The Iodine passed into the Chloroform with the customary colour. (This method is preferable to the use of Chlorine Water.)

It is of interest to remark that a rheumatic sufferer had to take 10 grains 3 times a day after meals for 3 days before the Iodine was found in his urine, whilst a normal individual gave evidence of Iodine, as stated, in an hour after taking the dose.

It is noticed also that the urine of some individuals becomes promptly cloudy owing to an increased elimination of Uric Acid. The point is of value from the clinical aspect to those who still hold to the Uric Acid theory of rheumatic affections.—W.H.M.

Elimination of Iodine.—A paper discussing the rates of elimination of he Iodine of Alkali Iodides, of Pepto-Iodine, and of compounds in which the halogen is firmly bound to the Benzene ring, *e.g.*, Iodoguaiacol and Tetraiodophenolphthalein. In this third instance elimination is at a slower rate than in that of the Alkali Iodides, and practically all the Iodine recovered in the urine and fæces is in an unionised condition, indicating that the compounds pass through either unchanged or as some other organic compounds. —F. R. Greenbaum and G. W. Raiziss, Jl. Ph. & Exp. Ther., Mar. '27,407.

Uses.—Small continued doses are suggested for treatment of rheumatic affections and in arteriosclerosis.

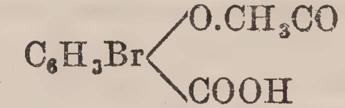
Aspriodine may also prove of service in asthma and in many other affections, where Iodides have proved beneficial, *e.g.*, in scrofula and for enlarged glands and wherever small continued doses of the two constituents are desired.

Broadly speaking, the substance has pronounced antiseptic powers —an important factor, because Aspriodine is well tolerated.

Aspriodine Tablets, Cachets and Slipules 5 grains (**0·3 Gm.**) are prepared.

Sodium-Aspriodine, Lithium-Aspriodine, Calcium-Aspriodine and **Magnesium-Aspriodine** have been prepared. These are also definite stable bodies which are new to medicine.

***Sedasprin** (T.M. No. 435197). *Syn.* ACETYL-BROMO-SALICYLIC ACID.



$$C_6H_3Br\left\langle\begin{matrix}O.CH_3CO\\COOH\end{matrix}\right. = 258{\cdot}972.$$

Dose.—5 to 10 grains (**0·3 to 0.6 Gm.**) afford a mild sedative effect. The dose should be given preferably alone in tablet (crushed), slipule (No. 1 for 5 grains), or cachet form, with water.

Chemical Composition.—Sedasprin is a definite compound, containing 30·86% *Bromine*, the balance (69·14%) being the *Aspirin* radical. It was apparently first made by Robertson (J.C.S.T. 81 [1902], p. 1482), but it has not been used medicinally until introduced by the author (1923). In common with Aspriodine, this Bromine analogue is stable at ordinary temperatures. It has M.pt. 136° C.

Soluble in Chloroform 1 in 11·5, Ether 1 in 4, slightly in Benzol in Absolute Alcohol 1 in 10; in Alcohol 90% 1 in 4; slightly in water (1 in 1500).

Potassium Citrate with Sedasprin.

Working on lines similar to the experiments with Aspirin (*q.v.*), we found increased solubility, but the solution is not permanent.

Incompatible with alkalis. It is best given uncombine with other medicaments.

Pharmacology and Uses.—Pharmacologically the proces of absorption of Sedasprin is analogous with that of Aspriodine Clinically the effect of Sedasprin is quite distinct from that of Aspirin A remedy embodying the acknowledged anti-rheumatic, anti neuralgic and febrifuge properties of Aspirin, with the sedative an hypnotic powers of a Bromide, should be of importance.

It has been suggested for use in all forms of nerve trouble, man types of headache, dysmenorrhœa, asthma, chorea, epilepsy, fevers influenza, insomnia, laryngitis, neuralgia, sea-sickness and tonsillitis in general, in cases where the combined qualities of Aspirin an

Bromide are indicated. In chronic bronchitis, given at night as required, it has given relief.

Neuralgic pains not affected by Aspirin were instantly relieved by Sedasprin.—Major G. W. Vincent, 24/9/26.

Sedasprin Tablets, Cachets and Slipules, 5 grains (**0·3 Gm.**), are prepared.

Sodium-Sedasprin, Lithium-Sedasprin, Calcium-Sedasprin and **Magnesium-Sedasprin** have in addition been made. They are definite compounds, new to medicine.

Liberation of Bromine from Sedasprin in the System.

Although in the case of Aspriodine, inorganically combined Iodine can readily be shown in the urine shortly after taking a small dose of the compound, the demonstration of Bromine after taking a dose of the Bromine analogue is not so easy a matter. Briefly, we are of opinion that in each case the Bromine is *absorbed*.

Examination of the urine and fæces, even subsequent to taking a dose of Potassium or Sodium Bromide, shows that elimination is very slow.

Although we failed to demonstrate Bromine in the urine of an individual after taking Sedasprin, inorganically combined Bromine was found in the fæces, and there was evidence also of a small amount of organically combined (? Bromo-Salicylic Acid). The assumption is that the halogen in the compound Sedasprin is split off on lines similar to those occurring on assimilation of Aspriodine. Clinically the effect of Sedasprin is entirely distinct from that of plain Aspirin.

Bearing on the subject, one may add that most divergent statements are found in the literature. Hanzlik, *e.g.*, found that 40% of a dose of Salicylic Acid, taken by a normal person was excreted in 24 hours.—B.M.J. i./22,233.

Devrient (Arch. Exp. Path. Pharm. 1921,90, p. 242) says that not more than 15% of a dose of Salicylic Acid administered is excreted in the urine.

Hanzlik, Scott and Thoburn, B.M.J. ii./17,296, found 75% excreted by normal persons under certain conditions, and so on.

Urine Examinations after taking various Bromine Compounds (Sedasprin, Adalin and Potassium Bromide), see Vol. II.

Methyl-Aspriodine. *Syn.* METHYL-IODO-ASPIRINATE, METHYL-ACETYL-IODO-SALICYLATE. (*Aspriodine is a Reg. T.M.)

$C_6H_3I.O.CH_3CO.COOCH_3=320\cdot004$.

Chemical Characters.—Methyl-Aspriodine forms white crystals in small agglomerated granules with the interesting characteristic of melting at body temperature, 40° C. (104° F.), to a light yellow liquid with Sp. Gr. 1·6. In temperate climates it is therefore solid or waxy, while in tropical climates it will be liquid. In either form it is practically odourless; its taste is aromatic and pungent. It contains the equivalent of 56·3% *Aspirin and* 39·7% *Iodine.*

Solubility.—It is readily soluble in all the usual organic solvents, *e.g.*, Ether, Chloroform, Alcohol, and it is miscible with Olive and Almond Oils in all proportions. It is also soluble 1 in 50 in a mixture of 40% Alcohol in Glycerin. It is insoluble in water or plain Glycerin and is not miscible with Liquid Paraffin.

Uses.—In painful rheumatic joint affections, neuritis, sciatica, lumbago, sprains, headache, and broadly speaking as a prompt general local analgesic, Methyl-Aspriodine, as such, or as Balm or Liniment, is advised. (For inflamed areas, *e.g.*, enlarged glands, very light application of the Liniment or Balm may be tried.) Some cases in which the compound has been successfully used are mentioned on p. 88.

The parent substance, Aspriodine ($C_6H_3I.O.CH_3.CO.COOH$), introduced by the writer in 1923, has been proved of value *per os* in combating rheumatic affections and in a large variety of conditions where the combined effects of Aspirin and Iodine are requisite. Following up the chemistry and pharmacology of the Halogenised Aspirin derivatives, on which the author has been at work for years an attempt was made to modify Aspriodine in such a way as to convert it into a compound suitable for inunction at the site of pain. The introduction of Methyl-Aspriodine, in 1926, was the result of this investigation.

Methyl-Aspriodine permits of the local use of considerable doses of Aspirin and Iodine conjointly. Alternatively, one may view its use as the combined employment of Acetylated Methyl Salicylate and Iodine. Logically, one may suggest that as Aspirin is a more effective anti-rheumatic than the parent Salicylic Acid, Methyl-Acetyl-Salicylate may be more reactive than ordinary Methyl Salicylate (*Oleum Gaultheriæ*). The high percentage of Iodine is an additional argument in favour of the compound.

Directions.—*5 to 20 grains* (**0·3 to 1·2 Gm.**), *or, if liquid, 7 to 30 drops may be lightly rubbed into the affected part.* Upwards of grains of Methyl-Aspriodine will 'lie on a sixpence,' and 20 grain 'on a shilling.' A small quantity almost completely disappear when rubbed into a few square inches of body surface.

A potent preparation of this kind is not intended to be vigorously rubbed into an extensive tender or inflamed area. The writer has information of dermatitis caused by a patient making too vigorou use of the substance (in the pure condition), *viz.*, rubbing it into the shoulder for eight successive days. The dermatitis completely cleared after treatment with a little Calamine Lotion : the arthriti pain also disappeared.

Apart from two cases of dermatitis, *no other adverse reports* hav been brought to the notice of the author. Indeed, some local re action may even be salutary in obstinate cases. Intermitten rather than daily use may be recommended.

There is initially a slight warming or tingling sensation, or in som cases a mild local anæsthetic effect.

Mucous Membranes.—Originally, it was thought desirable t direct that Methyl-Aspriodine should not be used to the mucou membrane. It has, however, since been employed in neuralgi affections of the gums. See **Methyl-Aspriodine Pigment**, *postea.*

In addition to the pure substance, the following are prepared :

Methyl-Aspriodine Balm, containing 50% in a Lanolin basis. This may be preferred by some patients.

Directions.—5 to 30 grains (**0·3 to 2 Gm.**) to be lightly applied.

Methyl-Aspriodine Liniment.—This contains 20% of Methyl-Aspriodine, with Camphor 10%, Chloroform 10%, and Menthol 2% in Olive Oil.

Directions.—A small quantity to be lightly rubbed into the part.

Methyl-Aspriodine Pigment.—A 2% solution in an Alcohol and Glycerin solvent. Suitable for inflamed gums. The taste is somewhat comparable with that of Glycerole of Tannin.

Internal administration.—Doses of 5 to 10 grains of Methyl-Aspriodine are suitable for use *per os*, and Iodine has been detected in the urine within 2 hours of taking a 5-grain dose. (Experiments by four normal individuals in the author's Laboratory.)

It is suggested that obstinate cases which fail to respond adequately to the compound employed locally may be treated with the substance by the mouth, or indeed by a combined medication.

Methyl-Aspriodine Capsules containing 5 and 10 grains (**0·3 and 0·6 Gm.**) are prepared.

Intramuscular injection.—It is possible that Methyl-Aspriodine (in suitable dilute form) might be used intramuscularly. No data as yet are available.

Pharmacology.—On inunction of suggested therapeutic doses into the body, neither the Iodine nor the Salicylic radical could be readily traced in the urine, but this negative result is of interest. The urine was tested for Iodine by the method described under Aspriodine. Similar negative data are obtained with a large number of drugs used locally.

We recalled the interesting work of Prof. R. B. Wild and Miss Ivy Roberts (B.M.J. i./26,1076) with Mercurial preparations (see Ung. Hydrarg.). They found, *inter alia*, that 4 Gm. of Mercury Ointment (B.P. '14) gave an absorption into the body of 0·12 Gm. Mercury when used for 2 minutes and 0·17 Gm. in 10 minutes.

Prof. Wild, however, was not able to investigate the urine of normal persons who received the rubbings. Indeed, we do not recall any systematic examination of the urine of persons so treated.

It seemed of interest to carry Prof. Wild's work a stage further, weighing the non-absorbed quantities and examining the urine for Mercury and other well-known medicaments (as tried) that are used locally and are known to be efficacious.

The following is a resumé of the work (Assistant C.C.P.):—

Ointments in Lard Basis.	Strength %	Amount used. Gms.	% Ointment absorbed.	% Medicament absorbed.
UNG. ACIDI BORICI	10	2·5	20	2·0
,, ,, SALICYLICI ...	10	2·5	20	2·0
,, BETANAPHTHOL ...	10	2·5	20	—
,, BISM. SUBGALLAS ...	10	3·0	23	1·5
,, CALOMEL	20	2·5	16	2·0
,, CUPRI OLEATIS ...	24	2·5	20	3·4
,, HYDRARGYRI	30	2·5	16	4·4
,, ,, AMMONIAT.	10	2·5	16	2·2
,, ,, OLEATIS ...	10	2·5	16	1·0
,, ,, OX. FLAV.	10	2·5	16	1·4
,, IODI	10	2·5	20	2·0

Ointments in Lard Basis.	Strength %	Amount used. Gms.	% Ointment absorbed.	% Medicament absorbed.
UNG. POTASSII IODID. ...	10	3·0	20	0·7
,, QUININÆ HCl.... ...	40	2·5	15	6·0
,, SODII SALICYLATIS ...	10	2·5	20	2·0
,, ZINCI	15	3·0	17	3·0

In no instance could the active constituent of these ointments be traced in the urine during the same day. The specimens were evaporated and examined by delicate analytical methods.

To summarise therefore: It is shown that a number of chemicals, *e.g.*, the potent Mercurials, of known efficacy in divers complaints, when rubbed into the skin, cannot be traced promptly as having passed through the system.

We note further that Prof. A. J. Clark in "Applied Pharmacology" gives a graph relative to work by Lomholt, showing that a few mgr. of Mercury could be found in the urine after daily rubbings for six weeks with large amounts (3 Gm.) of 50% Ung. Hydrarg., *i.e.*, the bulk of the Mercury is absorbed into the body, probably as a fatty acid compound.

In order that a drug may be absorbed, as explained by Prof. W. E. Dixon ('Manual of Pharmacology'), it must pass through either a sebaceous or sweat gland, since absorption through the horny epithelium is impossible. The cutaneous glands are filled with fatty material to which water is impervious, so that a drug, to be absorbed, must be dissolved either in fatty substances or Alcohol, all of which find their way through the fat.

Methyl-Aspriodine being soluble in fats, fulfils these requirements.

The writer has received numerous expressions of opinion from the Medical Profession on Methyl-Aspriodine. The following are typical cases in which the compound has been found of value:

RHEUMATISM.—Methyl-Aspriodine, as crystals, liniment, and balm, has been used in about 100 cases and has given better results than any similar compound for local use. A suitable preparation for the type of disability treated in this country.—Vincent Coates, 1927.

FIBROSITIS.—Methyl-Aspriodine as a routine treatment was found to be much more successful in rheumatic affections than Methyl Salicylate.—A. J. Lennane, 1927.

It relieves pain and in the limited number of cases treated it was considered to be the best local application.—J. A. Venning, 1927.

SCIATICA, LUMBAGO, RHEUMATISM, SPRAINS, ETC.—In the relief of pain excellent results were obtained with the ointment and liniment.—H. D. J. Lazarus, 1927.

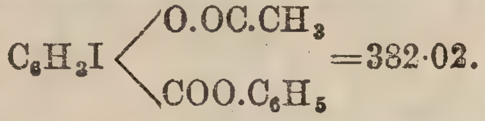
Found of benefit in a case of sciatica.—G. E. W. Henderson, 1927.

STRAINED TENDONS.—In two cases which were of old standing and had not yielded to ionisation or massage, improvement followed the use of Methyl-Aspriodine.

Methyl-Sedasprin the analogous derivative of Sedasprin, has also been prepared.

Phenyl-Aspriodine. *Syn.* ACETYL-IODO-SALOL.

(**The name Aspriodine is a Registered Trade Mark.*)



$$C_6H_3I\left\langle\begin{array}{l}O.OC.CH_3\\COO.C_6H_5\end{array}\right.=382{\cdot}02.$$

Dose.—5 grains (**0·3 Gm.**) in tablet (crushed), cachet or slipule, with a little water. The dose may be cautiously increased. It should be given *as such*, not admixed with other chemicals.

This body, which is new to medicine, is also the outcome of work by the author on compounds of the nature of halogenised Aspirin. The Salol principle (Nencki) is involved in Phenyl Aspriodine. The ester passes unaltered through the stomach, to be split up by the alkalinity and saponifying enzymes of the intestines. The constituents are then slowly absorbed.

The compound is obtained as a white, crystalline powder of neutral reaction containing 33·22% of Iodine. The phenyl radical in it is equivalent to 24·6% approximately of Phenol. It is a stable body giving practically no colour with Ferric Chloride. It has M.pt. 123° C.

Soluble in Chloroform 1 in 3, in Alcohol 90% 1 in 250. Insoluble in water.

Pharmacology and Uses.—Phenyl-Aspriodine embodies the therapeutic effects of Iodine, Aspirin and Phenol. It is resistant to physiological acid but split up in presence of physiological alkali at body temperature. The dose of the substance is, in great measure, dependent on the Phenol content. This should be borne in mind, to prevent too potent effect.

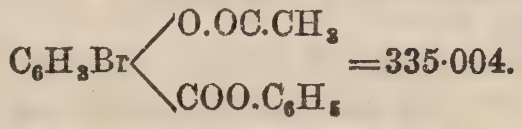
In some instances its use should supersede that of Salol as the antiseptic power of the compound is enhanced by its containing 33·2% Iodine.

The special claim of this drug is as an intestinal and urinary antiseptic. In 5 grain doses it causes slight darkening of the urine. Phenyl-Aspriodine may prove effective in typhoid and dysentery and in gonorrhœa. It should further be tried in rheumatic affections, neuralgia and in arteriosclerosis. ***Contraindication.***—It should not be given where the kidneys are affected.

Phenyl-Aspriodine Tablets, Cachets and Slipules, 5 grains (**0·3 Gm.**) each are prepared. No. 1 slipule holds 5 grains.

Phenyl-Sedasprin. *Syn.* ACETYL-BROMO-SALOL.

(**The name Sedasprin is a Registered Trade Mark.*)



$$C_6H_3Br\left\langle\begin{array}{l}O.OC.CH_3\\COO.C_6H_5\end{array}\right.=335{\cdot}004.$$

Dose.—5 grains (**0·3 Gm.**) carefully increased if desired. It is preferably given *as such* in tablet (previously crushed) or in cachet or slipule (No. 1 holds 5 grains), with a little water.

This compound is the Bromine analogue of Phenyl-Aspriodine

It introduces the Salol principle in medicine to the halogenised Aspirins, which have already been considerably tried in treatment.

Phenyl-Sedasprin is in white crystalline masses of neutral reaction containing 23·85% Bromine. The phenyl radical present is equivalent to 28% approximately of Phenol. It is stable at ordinary temperatures and gives practically no colour with Ferric Chloride (absence of Salicylic Acid and Bromo-Salol.) It has M.pt. 118° C.

Soluble in Chloroform 1 in 3, in Alcohol 90% 1 in 380. Insoluble in water.

Pharmacology and Uses.—Phenyl-Sedasprin embodies the activities of Bromine, Aspirin and Phenol. It resists physiological acid but readily splits up in presence of physiological alkali at body temperature. Care should be taken to avoid over-dosage. The dose is limited to the equivalent content of Phenol. The compound should possess advantages over ordinary Salol as an antiseptic and antipyretic. It has especially antiseptic action on the urine, which is slightly *darkened in colour* after a dose of 5 grains. It is advanced for treatment of rheumatic affections, neuralgia, fevers, tonsillitis, laryngitis and particularly as a bactericide with sedative effect in urinary affections.

Contraindication.—It should not be given in renal disease.

Phenyl-Sedasprin Tablets, Cachets and Slipules, 5 grains (**0·3 Gm.**) each, are prepared.

Ammonium Ortho-iodoxybenzoate. *Syn.* AMIODOXYL BENZOATE, ✱ARTHRYTIN (T.M. 486610) $C_6H_4(IO_2).COONH_4=297·004$.

A white crystalline powder, containing 42·7% of Iodine, readily soluble in water. To avoid decomposition, it should be kept dry and away from sunlight.

Dose.—11 to 15 grains (**0·75 to 1 Gm.**) intravenously, or twice this dose orally.

Uses.—Chiefly in arthritis, the best response being obtained in patients presenting signs of active infection. It is best given intravenously, dissolved in 100 Cc. of Normal Saline and injected within 7 to 12 minutes, but orally and in 2 Gm. doses by high enema it has been found effective. Following intravenous use, reactions resembling non-specific protein reactions may occur. The salt is quickly reduced in the blood stream, and it is stated to stimulate phagocytosis of streptococci and staphylococci by human leucocytes.—Jl. A.M.A. ii./27,1061.

ARTHRITIS, 33 cases classed as follows :—Arthralgia 2, acute arthritis 12 chronic arthritis 16, gonorrhœal arthritis 2, acute rheumatic fever 1, were treated. Twenty-eight, or 85% of these cases, showed moderate to marked improvement, with relief of pain, swelling, and spasm.—Millard Smith Boston Med. & Surg. Jl., Feb. 24, '27, per Jl. A.M.A. i./27,1352.

Acetyl-para-amido-Salol. Salophen. P. BELG., HELV., SVEC. PH. NED. V.

$C_6H_4\ OH.COO.C_6H_4NH.COCH_3=271·112$.

PATENT 11,833/1891 and 3435/1892, both now lapsed.

Dose.—10 to 15 grains (**0·6 to 1 Gm.**) 3 or 4 times a day in cachets
Tablets, 5 grains, are prepared.

White crystalline scales, tasteless; soluble in alcohol, ether, and alkalis almost insoluble in water. It contains about 50% salicylic acid. ***Incompatible*** with Alkalis and their carbonates. It is unaffected by gastri juice, but decomposed by pancreatic ferment. Anti-febrile and anti-rheumatic. Used in chorea, neuralgia, sciatica, headache, and throat affections. Ointment 10% in Lanolin for psoriasis and other skin affections.

Crésopirine. *Syn.* ACETYL-ORTHO-CRESOTINIC ACID.

(1 : 2 : 6) $CH_3.C_6H_3.COOH.OCOCH_3$.

Has an antipyretic and analgesic effect on acute rheumatic fever superior to Sodium Salicylate, and analgesic action in chronic rheumatism superior to Aspirin. It has very low toxicity. No dose is stated.—per B.M.J. i./27,635.

ACIDUM STEARICUM, U.S., P.Jap.

Stearinum, P. Austr. *Commercial Syn.* "STEARINE' wrongly so called. $C_{17}H_{35}COOH = 284·288$.

This monobasic acid occurs as a hard white solid substance and is not entirely pure. It is prepared by decomposition with superheated steam of Stearin (the triglyceride of stearic acid contained with those of palmitic and oleic acids in tallow). ***Soluble*** about 1 in 18 of alcohol 90%. Readily soluble in ether.

Melts at about 56° C. (132·8° F.) (U.S.). This melting point corresponds to a mixture of 40% stearic acid and 60% palmitic. A melting point of 58° C. (136·4° F.) would be better for some suppositories. *Vide* Glycerin.

It is obtainable commercially with m. pts. 50° C. (122° F.), 52·5° C. (126° F.), and 56° C. (132·8° F.). The pure acid melts at 69·2° C.

Commercially it contains 20 to 30% oleic acid. Iodine No. 21·7 would indicate about 24%. Pure stearic acid would of course have Iodine No. *nil*, which condition of purity may be approached by successive re-crystallisations from alcohol.

Cocoa-nut Stearine.—A white firm fat melting at 84° F. (29° C.) suggested for use as suppository basis, as having a melting point somewhat lower than cacao butter. It is obtained by chilling and pressing **Oil of Coconut** (Cocoa-nut Oil or Cocoa-nut Butter, **Oleum Cocos**, P.G. II.), *i.e.*, the oil or butter from the *Cocoanut Palm, Cocos Nucifera* Linné, hence to be distinguished from the product called Cocoa Butter (Oleum Theobromatis, *q.v.*). Oil of cocoanut is solid between 40° and 50° F., and liquid at about 80° F., and has characteristic odour. It is used as a substitute for lard and largely in soap manufacture. The dried pulp of the Cocoanut is known as **Copra**. The endocarp or meat of the nut is said to be a powerful tænicide. The patient should drink the milk and then eat the flesh of the nut.—U.S.D.

Cocoa-nut Oil has usually very low Iodine number—about 8. The oil from the *rind*, however, gives as high as 25 or 40.

Cocoa-nut Oil Soap. This, according to Lewkowitsch (quoted in Thorpe's Dictionary), can be prepared by a simple cold process, not requiring anything in the nature of boiling. To the fat, previously warmed to about 35° C., an accurately measured quantity of Caustic Soda Sp. Gr. 1·35 (*i.e.*, 32%) is added with stirring. (Use approx. 2¾ of this lye to 5 of Oil. This will saponify with slight heating.) The mass is allowed to stand and becomes warm, and saponification is effected in 24 hours. The soap is not 'salted out,' that is, it contains the Glycerin formed.

For making a COCOA-NUT SHAMPOO the following is suggested :—

Dissolve Sodium Hydroxide and Potassium Hydroxide, of each 1 part, in 5 parts of Distilled Water and when cold add spirit 5 parts; melt Cocoa-nut Oil 10 parts, and when this is nearly cooled to the congealing point add it gradually to the alkaline solution with shaking. Continue shaking occasionally for 10 to 20 minutes; finally add water enough to make 50. The preparation is alkaline, and can be neutralised with a little Oleic Acid. Terpineol and Coumarin are suitable perfumes.— C. & D. Oct./1920, p. 1426.

Further Suggestions are:

COCOA-NUT SHAMPOO. Heat Cocoa-nut Oil soap 2 ounces with Glycerin 1 ounce and water 7 ounces on the water bath to dissolve, allow to deposit and add Oil of Bay 5 drops.

COCOA-NUT OIL SOAP FOR THE LAST MENTIONED. Dissolve Potassium Hydroxide and Sodium Hydroxide of each 20 Gm. in distilled water 50 Cc. and mix intimately with Cocoa-nut Oil (liquefied) 200 Gm. Allow to stand in a warm place 24 hours. If proportions correct a hard white nearly neutral soap is formed.—C.D. January 7/22, p. 12. See also P.J. ii/21 407. We may add that, according to theory, 5½ parts of Oil require 1 part, in round figures, of Caustic Soda.

Germicidal efficiency of Cocoanut and Linseed Oil soaps.—per Jl. A.M.A. ii./25,1757.

ACIDUM SULPHURICUM.

Syn. OIL OF VITRIOL. $H_2SO_4=98{\cdot}08$.

'*Poisonous.—Not to be taken.'—For further conditions of sale v.* p. 42. *Dose.*—1 to 2 minims (0·06 to 0·12 Cc.).

With Sp. Gr. 1·843 contains 98% by weight of hydrogen sulphate. **B.P. '14.**—Sp. Gr. 1·841, *i.e.* 95%.

"Contact Process" of manufacture. A mixture of Sulphur Dioxide and Oxygen is passed over finely divided Platinum or Oxide of Iron which acts as catalytic agent, causing union of the gases. By dissolving the Sulphur Trioxide thus formed in water, Sulphuric Acid is obtained.

Use.—Very occasionally as caustic.

Pruritus has been treated by internal use of, even when alkalinuria is absent. Dose, 1 tablespoonful every 2 hours of 1½ to 2½% solution. The itching is said to disappear rapidly.

Antidotes.—Magnesia and *cf.* Acidum Hydrochloricum.

Sulphuric Acid "Arsenic-free" is specially prepared to stand the Marsh-Berzelius Test 1 hour.

Acidum Sulphuricum Aromaticum (*B.P.* '14). *Syn.* ELIXIR OF VITRIOL. *Dose.*—5 to 20 minims (0·3 to 1·2 Cc.).

This contains a small amount of (aromatic) ethylsulphuric acid. The preparation would be improved by carefully heating the mixture of acid and alcohol to encourage the formation of the vinous acid. Contains 12·9% *w/v.* of hydrogen sulphate, and has Sp. Gr. 0·917 to 0·923.

Figures showing progressive decrease in acidity of this preparation. At end of one year the acid had lost 14·68% of its acidity.—H. C. Walker, P.J. i./21,130.

Acidum Sulphuricum Dilutum. (*B.P.* '14). Sp. Gr. 1·069. *Dose.*—5 to 20 minims (0·3 to 1·2 Cc.).

Contains 10% as also U.S., FR. CX., F. NORSK. and P. HELV. PH. NED. V. is 4 × N., *i.e.*, 19·6%, P.G. VI. 15·6 to 16·3%.

Carbuncles, boils, staphylococcic infections and certain streptococcic infections have been treated by internal use of Dilute Sulphuric Acid—20 to 30 minim doses with 2 ounces of water every hours (small doses in carbuncle are no use). Externally 1 in 2 Carbolised Vaseline. Cases of bronchiectasis and pulmonary tuberculosis where there is often a staphylococcic infection have also benefited. It has been given for prophylaxis and treatment in puerperal fever.

Incompatible with alkalis and carbonates. It precipitates barium and calcium from solutions of their salts, also soluble lead and silver salts.

Acidum Sulphuricum Fumans. *Syn.* NORDHAUSEN SULPHURIC ACID or **'Oleum,'** Sp. Gr. about 1·9. Contains some sulphuric anhydride dissolved in sulphuric acid. When made by distillation of Ferrous Sulphate, Ferric Oxide or **Colcothar** or **Polishing Rouge** remains behind. The formula $H_2S_2O_7$, *i.e.* $H_2SO_4 + SO_3$, contains about 45% SO_3. Commercially the range of SO_3 content is from 10% to 40%.

ACIDUM SULPHUROSUM.

H_2SO_3=82·08 ; SO_2=64·064.

Dose.—½ to 1 drachm (**2 to 4 Cc.**).

A colourless liquid, with strong sulphurous odour, and containing **B.P. '14,** 5% of SO_2. Sp. Gr. 1·025.

Preparation.—By roasting sulphur or by heating copper and sulphuric acid, or carbon and sulphuric acid, and dissolving the gas in water. Sulphur Dioxide is also available compressed in cylinders.

Uses.—This solution of Sulphurous acid is applied externally as a lotion—one part to two or more of water and sometimes a little glycerin added—for parasitic affections such as chloasma, ringworm, pruritus, thrush, and chapped hands, with very good results. It is sprayed into the throat for tonsillitis, diphtheria (better diluted) and asthma, or used as an inhalation, a teaspoonful to a pint of cold water. It is strongly antiseptic, and has been used in whooping cough by fumigating the room. Also diluted, for fœtor of the teeth, *e.g.* in syphilis.

Internally it has been used in cholera (freely diluted). As a rectal injection, a 1 or 2% solution of the gas. Also for gastric fermentation accompanied by sarcinæ, and in typhoid (20 to 30 minim doses, diluted) every 2 or 3 hours.

Magnesii Sulphis, $MgSO_3+6H_2O$=212·48.

Dose.—10 to 30 grains (**0·6 to 2 Gm.**).

White crystalline powder. Soluble 1 in 90 in water. Given in diphtheria and other infectious diseases. Large doses may be given with impunity. **Tablets** 5 grains.

Sodii Hyposulphis.—*Syn.* SODIUM THIOSULPHATE (*B.P.* '14). **U.S.** $Na_2S_2O_3+5H_2O$=248·202. *Dose.*—10 to 60 grains (**0·6 to 4 Gm.**) Crystals soluble in water 1 in 1. Insoluble in alcohol.

Uses.—As a lotion, 1 in 10 for chloasma, ringworm, &c. It may be made to evolve sulphurous acid as, *e.g.*, in the following : Sodium Hyposulphite 6, Diluted Sulphuric Acid 1, Water 32.

Useful in clearing out the intestinal tract (in arteriosclerosis).

In Italy medical men and the general public demand sodium hyposulphite (specially re-crystallised). For internal use the dose is from 1 to 6 grammes as a purgative ; its antiputrescent action is said to be superior to that of the sulphite. While passing through the blood stream it is transformed firstly into sulphite and then into sulphate.—Ph. Notes.

Moist applications of a 1 or 2% solution of Sodium Hyposulphit beneficial in treatment of burns, and dermatitis caused by Arseni and Mercury.—per Jl. A.M.A., ii./25,636.

ARSENICAL POISONING has also been treated with Hyposulphit *per os* and hypodermically. The chief method is intravenous, follows :—

Intravenous Use in Mercurial and Bismuth Stomatiti and Arsenical Poisoning.—Arsenical dermatitis and mercuri poisoning well treated by Sodium Thiosulphate intravenously—stated to non-toxic up to 2 Gm. doses.—W. L. McBride and C. C. Dennie, per Jl. Tro Med., April 2/23,114.

In dose of 3 to 4 injections of 0·45 to 0·6 Gm. in 5 Cc. of water intravenous alternate days it is potent for Mercurial and Bismuth Stomatitis and for effec of Arsenical toxæmia—possibly for all acute metal poisoning.—H. C. Semo B.M.J. i./24,664.

Large doses (2 Gm. or over) of Sodium Hyposulphite intravenously wi *not* cure Arsenical dermatitis, but will make it worse, owing to the fact th it does not precipitate metals as sulphides, as thought, but dissolves the out of their storage depots, and permits the kidneys to eliminate them hyposulphites, and if too much is dissolved at first the kidneys are ove whelmed by the toxic metallic solution and the systemic poisoning actual increased. The best dosage is that advocated by Dennie and McBric (Jl. A.M.A., Dec. 27, '24), *i.e.*, 0·3, 0·45, 0·6, 0·75, 0·9 Gm., etc., with interva of a day or two.—H. Schussler, Jl. Intrav. Therap., Jan. '26,11.

See also our pp. 180, 202.

Mercurial stomatitis and a case of tissue reaction due to leaking of Ne arsphenamin from a vein treated by 0·45 Gm. Hyposulphite in 10 Cc. 0.6 Gr given prior to Arsphenamin was followed by slight rigor.—China Med. J Sept. '25, per C.D. ii./25,899.

Sterules of Sodium Hyposulphite are prepared, **0·2, 0·45** an **0·6 Gm. in 5 Cc.**

✻**Ametox** (T.M. 451286) and ✻**Thiostab** (T.M. 458531) are special pr parations of Sodium Hyposulphite for use in dermatitis and stomatit following Arsenic, Mercury and Bismuth medication.

Lotio Sodii Thiosulphatis, Mid. H. Sodium Hyposulphite 20, Sulphuro Acid 45, Glycerin 30, Distilled Water to 568. In tinea versicolor.

DISTEMPER in dogs is well treated by Sodium Hyposulphite. First give purgative of 4½ to 7½ grains of each Calomel and Scammony, then the hyp sulphite. 9 to 15 grains in milk or sugar and water next day for 10 days.

Respirator Solution.—Sodium Carbonate Cryst. 60, Sodium Hyp sulphite 52, Water 100. A proportion of Glycerin should be added to kee the wool or material moist. P. A. W. Self came to the conclusion that t above is the most satisfactory to neutralise both Chlorine and the Aci formed.—P.J. ii./15,133.

Sodii Hydrosulphis. $Na_2S_2O_4 = 174{\cdot}122$.

White powder soluble in water. An active reducing agent used manufacturing processes.

Sodii Hydrosulphidum. *Syn.* Sodium Sulph-hydrate. $NaHS = 56{\cdot}181$.

When fresh this is in hygroscopic crystals, very soluble in water. Used analytical work.

ACIDUM TANNICUM.

Syn. TANNIN. $C_{14}H_{10}O_9 = 322{\cdot}08$.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**).

Extracted from galls with ether containing a little alcohol and wate

Estimation by precipitation with an aqueous solution of Strychni Acetate. It was found that after drying all Tannins gave the same resul using the factor 0·6558 for converting the Strychnine Tannate into Tannin. S. R. Trotman, C.D. ii./13,851.

Hooper's Cinchonine and Crouzel's Phenazone method (modified) fou to be the most accurate for estimating Tannic Acid. Tannic Acid B.P.

a mixture of Tannin, Gallic Acid and Water.—W. B. Forbes, P.J. i./26,225, C.D. i./26,305.

Identification and classification by chemical methods of drugs containing Tannin. Application of the Goldbeater's Skin Test. Investigation of Stiasny's Test for Phlobotannins.—C. J. Jordan and A. H. Ware, P.J. ii./24, 102.

Soluble in water 1 in 1 slowly, and in glycerin, less so in alcohol 90%. Almost insoluble in ether and chloroform.

Incompatible with ferric salts, acids, alkalis, silver and other metals and with gelatin—*cf.* Tannalbin *infra*. Furthermore, Tannin solution precipitates the majority of alkaloids from solution, hence is occasionally employed as an antidote to these.

Uses.—Throat and mouth wash 1 to 2%. Astringent and styptic in powder form for epistaxis (by coagulating the albumin). Sometimes given in dysentery. Rectal injection of 30 grains in a quart of hot water, with or without opium, has been given in cholera. Burns have been treated with a 2 to 3% solution in ether painted over the part 2 or 3 times daily. It is a useful astringent applied to the gums and as an ingredient in tooth powders.

BURNS well treated with dressings saturated with 2½% aqueous solution of Tannic Acid.—E. C. Davidson, Surg. Gynec. & Obstet., Aug. '25,202, per Pres., Jan. '26,35.

DIARRHŒA.—Tannic Acid in mild cases of, is unnecessary and in severe cases is useless.—B.M.J.E. i./26,48.

DISINFECTION OF THE HANDS.—A 5% watery solution of Tannin of value, the Tannin acting as a fine coating (similar to a glove) which prevents bacteria entering the skin.—B.M.J.E. ii./24,78.

Glycerinum Acidi Tannici, atque cum Alumine, *v.* **Glycerin.**

Gargarisma Acidi Tannici contains 10% of Glycerin of Tannin.

Lotio Acidi Tannici Sulphurosa ST. BART.'S H.

Glycerin of Tannic Acid 1, Sulphurous Acid 1, Water to 8.

Ovules with Theobroma basis for vaginal discharges.—*v.* Ovules

Pessus Acidi Tannici 10 grains each in theobroma oil basis, 120 grains weight.

Suppositoria Acidi Tannici (*B.P.* '14).

3 grains with theobroma oil *q.s.* to 15 grains.

𝔇 𝔓1 **Suppositories of Tannic Acid with Opium,** 1 grain in addition, or 𝔇 𝔓1 Morphine ½ gr.—The latter are W.H.

Aluminii Tannas.—TANNAL INSOLUBILE.

$Al_2(OH)_4(C_{14}H_9O_9)_2+10H_2O$ is made by precipitating a solution of Aluminium Trisulphate with Sodium Tannate (not Tannin as stated in the paper) or better by treating freshly made Aluminium Hydroxide with Tannin Solution.—W. H. M. As astringent for chronic catarrh of the respiratory organs. —Y.B.P. 1913,122.

Albuminum Tannicum. P. Jap. U.S. X. *Syn.* ✱**Tannalbin.** (TRADE MARK 216134/1899, renewed 1912; PATENTS: see below, both became void).

Dose.—8 to 15 grains (0·5 to 1 Gm.), P. AUSTR., PH. NED. V. with method of making.

A compound of tannin with albumen, in pale brown insoluble, tasteless powder.

Manufacture.—According to the Patent Specification 6140 of 1896 Albumin 1 and Tannic Acid 2 are dissolved separately and mixed with stirring and the precipitate washed by decantation, etc., and dried. *Subsequently* the compound is to be heated for 6 to 10 hours at a temperature of 110° or up to 150° C. (This heating we found is of importance to render the Albumin portion resistant to solubility *v. infra.*—W. H. M.)

In a subsequent patent, 13,281 of 1896, the precipitate is directed to be left in contact with three times its volume of 90% Alcohol or twice its volume of 25% Hydrochloric Acid before filtering, washing and drying. This is said to obviate the necessity of heating the preparation as described.

The object of the preparation is to produce an Albumin Tannate (containing 50% of each of its components) which shall be soluble with difficulty in the stomach and shall dissolve gradually in the (alkaline) intestines.

TAMBACH'S TEST is used to ensure a satisfactory preparation. To determine the resistance to the stomach juice, maintain at body temperature fo three hours without stirring a mixture of 2 Gm. of Albumin Tannate with 100 Cc. of water containing Pepsin 0·25 Gm. and 20 drops of strong Hydrochloric Acid. The amount undissolved, after washing with a little cold wate and collecting on a weighed filter paper and drying at 100° C., should not b less than 1 Gm.

We found the effect of heating a sample to 120° C. is to render it less solubl in the digestive fluid than if dried at 60—70° C. only, *e.g.* 2 Gm. dried a 60° C. gave 0·76 Gm. of undissolved residue by Tambach's Test, wherea 2 Gm. of the same sample heated to 120° C. for 2 hours gave 1·2 Gm. of undissolved residue. It is of interest to note that the sample dried first at 60° C lost 10% of its weight on heating to 120° C. for two hours.

Uses.—A disinfectant soluble in the intestines, but unaffected by th stomach, given for diarrhœa.

Zinci Tannas. *Syn.* "SEL DE BARNIT."

Is obtained by treating Zinc Oxide 10 in Water 15 with Tannin 50 in Alcoho 45% 100. Dry at gentle heat. We have found this method satisfactory.

Used as ophthalmic application and for decubitus and other skin lesions.

Further **Tannates**. Details of making.—Y.B.P. 1913,125.

Di-acetyl-tannin. *Syn.* **Acetannin, Acidum Acetyltannicum, Tanny Acetate,** U.S. X. ✻**Tannigen.** (TRADE MARK 322568; PATENT 1228/189 ***Expired***).

$C_{14}H_8(COCH_3)_2O_9 = 406\cdot142$.

Dose.—5 to 15 grains **(0·3 to 1 Gm.) in cachet.**

Manufacture.—Tannic Acid 10 Gm., Acetic Anhydride 15 Cc. ; hea on water bath 1 hour. Add 25 Cc. Alcohol and pour the solution into 500 Cc of water, collect, wash and dry at not exceeding 60° C.—C. E. Corfiel and G. R. A. Short, P.J. ii./24,115.

A tasteless, insoluble powder, but rendered soluble by alkali. In diarrhœa Dissolves in the intestine appearing in the urine as gallic acid. Should not b prescribed with alkali. P. G. VI. defines as mainly a mixture of Diacetyl an Triacetyl-Tannin

Methyl Ditannin. *Syn.* ✻TANNOFORM (T.M. 216873). $C_{29}H_{20}O_{18}$ 656·16.

A compound of tannin with formaldehyde in reddish-white powder insolub in water, soluble in alcohol and alkalis. Used as an antiseptic in ointme (1 in 10) or dusting powder alone or with 1 to 4 parts of starch, for bedsore hyperhidrosis, pruritus, eczema (particularly in interdigital eczema), and pile In diarrhœa (*Dose*—from 1 to 20 grains according to age) and enteritis and f tender feet. Is official in P.G. VI.

ACIDUM TARTARICUM (*B.P.* '14).

$(CH.OH.\ COOH)_2 = 150\cdot048$.

Dose.—5 to 20 grains **(0·3 to 1·2 Gm.).**

Manufactured from acid potassium tartrate by heating with wat and sufficient calcium carbonate to almost neutralise, converting thus in insoluble calcium tartrate and soluble neutral potassium tartrate. The latt is also converted by aid of calcium chloride into calcium tartrate. The tw portions of calcium tartrate are washed and then decomposed with the necessa quantity of sulphuric acid.

Soluble 10 in 8 water, 1 in 2½ alcohol 90%, 1 in 4½ glycerin, 1 120 ether 0·720, 1 in 5 absolute alcohol. Nearly insoluble in benz and chloroform.

Incompatible with alkaline carbonates, and with potassiu calcium, and mercury salts.

Uses. For making Granular Effervescent Preparations, Effervescing Tablets (see Neutralisation Table for equivalents), and cooling drinks.

Specificity in Antiseptics.—This acid (as also Malic Acid) has been found to be active against *B. aerogenes capsulatus. Vide Vol. II.*

For details as to presence of Lead in Tartaric Acid and Method of Estimation, also for Acidum Glutaricum, Syn. Pyrotartaric Acid, see *Vol. II.*

Collutorium Acidum *Syn.* Acid Mouth Wash R.D.H.

Tartaric Acid 1 grain, Potassium Acid Tartrate 2 grains, Lemon Oil 3 minims, Saccharin Soluble $\frac{1}{2}$ grain, Water to 1 ounce.

P1 ACONITI RADIX (*B.P.* '14).

P1 *Aconite, Aconitine, and their preparations.*

Root collected from *Aconitum Napellus* (*Ranunculaceæ*) and dried. B.P. gives no dose but requires not less than 0·4% ether-soluble alkaloids. Fr. Cx. gives *Dose* (max. single), **0·1 Gm.**; max. during 24 hours **0·3 Gm.** That of P. Belg. in powder dried at 100° C. contains 0·8% alkaloids. If more, dilute with milk sugar.

P.G. V and Fr. Cx.—Selected heavy roots from the wild plant collected before the end of the flowering season. (Not in P.G. VI.)

U.S. X. assays biologically with *average dose* 1 grain (**0·06 Gm.**).

Use.—Anodyne, diaphoretic, diuretic.

Externally the liniment, as such, or mixed with chloroform or belladonna liniment in neuralgia and rheumatism (causes tingling and numbness).

Internally the tincture diminishes the force and rate of the pulse, especially in the early stages of fevers and mild local inflammations, such as feverish cold, laryngitis, and first stages of pneumonia and erysipelas. It also relieves the pain of neuralgia, pleurisy and aneurism. Large doses cause tingling of mouth and skin generally.

Acute tonsillitis. Children generally well treated by Aconite. For a child 5 to 10 years old, 1 to 2 minims of Tincture.—Yeo.

Physiological experiments on small animals show that Aconite is of no avail in reducing the frequency of the pulse, but in clinical practice good results are obtained in some manner from its use.—Sir Dyce Duckworth.

P1 Aconiti Folia may contain as much as 0·6% total alkaloid.

Fr. Cx. and Supp. Nouv. 1926 employ fresh leaves for making Alcoolature l'Aconit, 1=1 using 95% alcohol for macerating 8 days. To contain 0·1% alkaloids. Max. single dose 1 Gm., max. daily dose 5 Gm.

Antidotes.—Apomorphine $\frac{1}{10}$ grain hypodermically or an emetic of mustard or Ipecacuanha Wine; stimulants; Amyl Nitrite. Atropine Sulphate $\frac{1}{50}$ grain hypodermically has been recommended, also Digitalis Tincture 20 minims hypodermically in course of 4 hours was successful.

Aconite poisoning from taking Liniment in error. As Ipecacuanha Wine,—a cardiac depressant—had been given as first antidotal treatment, it was thought well to give only one mustard emetic to save the enfeebled heart. Head was kept low—feet raised, a sinapism was placed on the heart and hot flannels to the extremities and abdomen. Strychnine and digitalis hy dermically and brandy per rectum Artificial respiration kept up unce ingly, recovery after six hours. Quantity of Aconite was sufficient to six persons.—L. i./11,162.

Poisoning by a tablespoonful of Liniment containing 40 minims each I Aconiti, Lin Belladonnæ, Lin Chloroformi and Tinct Capsici with 80 mini Gaultheria Oil There was no dilatation of the pupils as would have b expected, nor odour of Wintergreen, but vomiting occurred smelling stron of it. Recovery under Liquor Strychninæ, 10 minims hypodermically an ounces of hot strong coffee into the rectum. A remarkable recovery tak the aconite into account which amounted to 35 times the maximum dose the official tincture.—L. ii/10,1270.

For Aconite and Belladonna combined see also 'Poisons and Antidotes.'

$\boxed{\text{P1}}$**Chloroformum Aconiti, B.P.C.** 1=1. Prepared as Chlo ormum Belladonnæ.—B.P.C. 1907.

$\boxed{\text{P1}}$**Extractum Aconiti Radicis Alcoholicum.** FR. CX. (EXTR D'ACONIT) prepared from the root with 70% alcohol and standa ised to 1% alkaloids. *Max. single dose,* ½ grain. Max. during hours 1½ grains approx.

$\boxed{\text{P1}}$**Fluidextractum Aconiti, U.S. IX.** (Not now in U.S.) *Average dose.*—**0·03 Cc.** (½ minim). Standardised to 0·5 G ether-soluble alkaloids of Aconite in 100 Cc.

$\boxed{\text{P1}}$**Linimentum Aconiti** (*B.P.* '14).

Prepared by macerating and percolating the root with Alcohol 90 Useful in neuralgia. *It is not suitable for painting on the gums.*

Should contain 0·2% *w/v* ether-soluble alkaloid.

9 minims of Aconitine liniment=about $\frac{1}{30}$ grain aconitine h proved fatal.

$\boxed{\text{P1}}$**Linimentum Aconiti Compositum.** G.H. *Syn.* **A.B.C. Linim** Aconite Liniment, Belladonna Liniment, Chloroform Linim equal parts. To be well shaken before use, as the olive oil in chloroform liniment is not soluble in the other ingredients. B. uses Liniment of Aconite 2, of Belladonna 2, Chloroform 1. cible. $\boxed{\text{P1}}$ **Linimentum Aconiti cum Chloroformo**, B.P.C. Chl form 1, Aconite Liniment 7.

The Oil in the original 'A.B.C.' formula seems to be essential—other proves too irritant to sensitive skins.

Poisoning by ½ ounce of A.B.C. liniment. Liquor Strychninæ and s enema 2 pints, containing 2 ounces brandy, saved life. Afterwards ¼ g morphine. The lethal effect of the aconite was abolished by stimul action of the atropine.

See also Poisons and Antidotes.

A.B.C. Lotion, St. Th. H. contains Carbolic Acid and Bo Possible confusion with Aconite, Belladonna and Chloroform I ment.—L.ii/22,1021

$\boxed{\text{P1}}$**Pilula Aconiti.**=2 minims of tincture, *i.e.* $\frac{1}{5}$ grain approx Root in each. *Dose.*—1 hourly.

$\boxed{\text{P1}}$**Tinctura Aconiti** (*B.P.* '14).

Dose.—2 to 5 minims (**0·12 to 0·3 Cc.**). As a febrifuge 2 mi every 10 minutes or quarter of an hour for an hour, then re dose every hour till skin acts well and temperature is reduced.

Strength 1 in 10 approx. by percolating dried root in No. 40 po with 70% alcohol and standardising to 0·04% ether-soluble alka

Fr. Cx. has the *B.P.* '14 strength made with 70% alcohol. It is termed *Teinture d'Aconit au dixième* and has max. single *dose* 9 minims approx.

P.G. V. (1 in 10). Maximum single dose, 0·5 Gm. Max. daily dose, 1·5 Gm. U.S. X. has 1 in 10, assayed biologically. Average dose 10 minims. P. Belg. and Ph. Ned. V. contain 0·05% alkaloids.

By the U.S. X. Assay, the tincture, administered subcutaneously to guinea-pigs, has a minimum lethal dose not exceeding 0·0004 Cc. per Gm. body weight.

P1**Tablets** are prepared each equivalent to 2½ minims. To be directed to be dissolved in a little water.

P1**Pastilli Aconiti, and** P1**Trochisci** contain each 1 and ½ minim of Tincture respectively. Given in fevers and mild inflammatory conditions.

P1**Fleming's** and **Turnbull's Tinctures** of **Aconite** are about six times the (*B.P.* '14) strength. They are used externally, and were given internally in doses of 1 to 5 minims.

Pharm. Form. says it should be particularly noted that Tincture of Aconite *Fleming* of all prescriptions, except British and American, is not this preparation but a 1 in 10 tincture.

Tincture of Aconite (*Fleming*) combined with equal volume of Weak Tincture of Iodine (*B.P.* '14) is frequently ordered to be painted on the gums for pain.

P1ACONITINA (*B.P.* '14).

Syn. Acetylbenzoylaconine. $C_{34}H_{45}NO_{11}$=643·368.

P1**Crystallised Aconitine.**

Dose.—$\frac{1}{600}$ grain to $\frac{1}{200}$ grain (**0·0001 to 0·0003 Gm.**), and may be increased if desired with extreme caution, the maximum single dose being 0·001 Gm.

Fr. Cx. gives 0·0005 Gm. as maximum during 24 hours.

B.P. '14 gives no dose, U.S. X. *average dose* $\frac{1}{400}$ grain.

An alkaloid obtained from *Aconitum napellus* root and dried leaves—content about 0·03%. In colourless crystals. ***Soluble*** in dilute acids, alcohol and chloroform (1 in less than 1), less readily soluble in ether, and almost insoluble in water and petroleum ether; melts at 198° C. In weak acetic solution yields a red crystalline precipitate with potassium permanganate.

U.S. assays biologically and tests for pseudaconitine and atropine by Vitali's test—*q.v.*

By the U.S. test, administered subcutaneously to guinea-pigs it should have a minimum lethal dose of 0·000000055 Gm. and not more than 0·000000065 Gm. per Gm. body weight.

A drop of dilute solution placed on the tongue produces a characteristic tingling sensation.

Antidotes, *vide* ***Aconite.***

Uses.—Employed externally (*vide* Unguentum Aconitinæ and Oleatum Aconitinæ) in neuralgia, *avoiding mucous membranes, and raw skin.* Internally in the form of a pill is a depressant, calmative, and diaphoretic.

P1 **Aconitinæ Nitras.** $C_{34}H_{\,5}NO_{11}HNO_3=706{\cdot}384$. A crystalli stable salt, soluble in water and alcohol. *cf.* Vol. II.

Dose.—$\frac{1}{600}$ grain (0·0001 Gm.), hypodermically.

P1 **Hypodermic Tablets** ($\frac{1}{640}$ grain), to be dissolved in warm wate

P1 **Granules of Aconitine** Fr. Cx. and of **Aconitine Nitra** Fr. Cx. contain $\frac{1}{10}$ mgr. in each, and are coloured pink.

P1 **Aconitinæ Hydrobromidum.** $C_{34}H_{45}NO_{11}.HBr.2\frac{1}{2}H_2O=769{\cdot}33$ and P1 **Aconitinæ Hydrochloridum** are crystalline Salts wi dose as for the Nitrate.

P1 **Oleatum Aconitinæ.**

Aconitine 2, Oleic Acid by weight 98. Dissolve ; may be perfume —is painted on the skin (avoid broken) for neuralgia.

P1 **Unguentum Aconitinæ** (*B.P.* '14).

Aconitine 1, Oleic Acid (by weight) 8, (1 grain=2 drops) ; he gently to dissolve, and add Lard 41. Mix thoroughly. Best fresh prepared. A piece of the size of a bean is gently rubbed in for faci neuralgia, avoiding broken skin and mucous membranes.

ADEPS LANÆ.

Wool Fat (*B.P.* '14). **U.S. X., Ph. Ned. V.** Anhydrous Lanoli

The purified yellowish cholesterin fat of sheep's wool, M.p about 40° C. Sheep's wool yields from 10 to 30%.

Trade Marks: 'Lanoline' 50214 (Class 48) and 50215 (Class 1886. Patent 4992/1882 *expired.* The specification states th 'the invention relates to a new or improved manufacture of fat matter from Wool Fat termed "Lanolin."' The process describ is of centrifugalising waste liquors of wool, washing and purifyi by a suitable solvent.—*cf.* C.D., March 20/15.

Soluble 1 in 25 ether, 1 in 18 oil of turpentine (both with so residual matter), almost insoluble in alcohol 90%.

Adeps Lanæ can only be saponified by alcoholic solutions of Pota under pressure—paraffin can be easily detected by this means.

Adeps Lanæ Hydrosus. **Hydrous Wool Fat** (*B.P.* '14). Commo known as 'Lanolin.' Wool Fat 7, Distilled Water 3. Melt a mix. Fr. Cx. and Ph. Ned. V. have 25% water.

Yellowish white ointment basis. More water, up to about eq weights of fat and water, may be incorporated with it without affe ing its consistence. Soluble partly in alcohol, while ether a chloroform dissolve only the fats it contains.

Wool Fat is readily absorbed by the skin (especially if washed w ether). It helps absorption of narcotic extracts, quinine, iodi potassium iodide and chaulmoogra oil.

When an ointment containing Mercuric Chloride or Carbolic A is ordered, it is usually intended for antiseptic purposes, theref the *anhydrous* should be used, otherwise caustic action may res

Sapolanoline. Lanolin 5, Soft Soap 4. For acne and eczema.

Unguentum Lanolini.

Lanolin (hydrated) 2, Soft Paraffin or Vaseline 1. Mix. May be perfumed to form **Lanolin Cream.** Less sticky than Lanolin.

Lanolin, lard and soft paraffin, *p.æq.* melted, give a useful basis, as also Wool Fat 9, with Almond Oil 1. **Unguentum Lanæ Compositum** (*B.P.* '14) is Wool Fat 2, Prepared Lard 2, Paraffin Ointment 1.

Crembas. A proprietary basis for making Vanishing Creams, Cold Creams and Toilet Creams generally. In the presence of a trace of alkali it will combine with from 1 to 5 times its weight of water, forming a white cream which is free from a greasy or sticky feeling. It may be mixed with Lanolin and water.

For other Ointment bases see Unguenta and for M.pts. of Fats, Table, *Vol. II.*

Cholesterol. *Syn.* CHOLESTERIN. $C_{27}H_{45}OH+H_2O=404{\cdot}384$, is prepared from wool fat by saponifying the same with potash, and extracting the cholesterol with ether. It is also a constituent of gallstones, often to the extent of 90% or more, and can be obtained from these by extraction with spirit.

TUBERCULOSIS is well influenced by giving cholesterin, to which it is thought to have antidotal power. Cholesterin is capable of arresting ferment production by lecithin. In carcinomatous tissue active intracellular ferments are thought to be present which are first set in action by lecithin. This substance is always found in marked amount in rapidly growing tissues. The administration of cholesterin will eliminate lecithin. Fifteen cases so treated showed diminution—and indeed disappearance—of the tumours.—M. '08,184.

PERNICIOUS ANÆMIA.—Cholesterin in form of cream and butter *ad lib.* has been given with success. (Cholesterin is antagonistic to hæmolysis.)

BLACKWATER FEVER has been treated by Cholesterin internally with success. Amelioration rapid—the urine beginning to clear in 2 to 6 hours after first dose. Also given as preventive. Generally gave 2 to 4 doses of 1 Gm. with intervals of 4 to 6 hours, suspended in milk.—Transvaal Med. Jl., July '10, per Pres. Oct,. '10, p. 183.

ERGOSTEROL extracted from ergot resembles Cholesterol in many reactions—*cf.* p. 597.

ÆTHER (*B.P.* '14).

[P1] *Applicable to Northern Ireland and* Ⓟ *Irish Free State.*

$C_2H_5.O.C_2H_5=74{\cdot}08.$

Syn. ÆTHER SULPHURICUS ; ETHYL OXIDE.

Dose.—45 to 60 minims (**3 to 4 Cc.**), or 15 to 30 minims (**1 to 2 Cc.**) repeated.

Manufactured by the distillation of Sulphuric Acid and Alcohol—Ethyl Hydrogen Sulphate being first formed which reacts with a further quantity of Alcohol, liberating Æther and Sulphuric Acid again; in this manner the Acid will react with a very considerable quantity of Alcohol. Sp. Gr. 0·720.

Soluble 1 in 10 of water, and the ether similarly dissolves about the same amount of water. Is miscible in all proportions with alcohol. Ether is a solvent for a number of alkaloids, fats, resins, and of mercury perchloride and biniodide, also of bromine and iodine.

Commercial Varieties in General Use.

(1) *From Pure Alcohol.*

Æther Purificatus (*B.P.* '14). For inhalation as anæsthetic. '**Æther.** Ph. Ned. V., P. Helv. and P. Jap. Sp. Gr. 0·720. *Syn.* **Æther Purissimus, Ether officinale, Æther pro Narcosi.**

In our own and several Continental Pharmacopœias this is directed to be carefully tested and preserved.

(2) *From Methylated Alcohol.*

Ether, 'Methylated,' Sp. Gr. 0·717 to 0·719.

Made from Industrial Methylated Spirit. Contains a little methylic ether, and is specially adapted for spraying to produce local anæsthesia, as it begins to boil below 27° C. (80° F.), and is free from water. It is not adapted for producing general anæsthesia.

Rectified Ether, Sp. Gr. 0·720. For General Anæsthesia.

Ether, well washed to purify it and redistilled. For producing general anæsthesia, if standing the tests given for purified ether.

Sterules, Anæsthetic, contain 1 and 2 ounces (30 and 60 Cc.) of this Ether for the operating bag and (being sealed) for hot climates.

Ether, 'Methylated,' Sp. Gr. 0·730 and 0·735.

Is adapted for pharmaceutical and technical extraction purposes. For photography a purer preparation, Sp. Gr. 0·725, is made.

✻**Ethanesal** (T.M. 410750). Was described as Ether free from mercaptans and aldehydes. It contains, dissolved, certain ketones, some CO_2 and some Ethylene, perfectly pure Ether being the vehicle. The CO_2 appears to act as a stabiliser. It is stated to be less irritating than ordinary Ether and to stimulate the respiratory system less.—R. L. Mackenzie Wallis and C. Langton Hewer, B.M.J. i./21,565; L. i./21,1173; Pr. Mar./22, 168. *See also* Sir C. English.—L. ii./23,302, and other refs., Edn. XVIII., p. 113.

The preparation was found to consist of 95·5% Ether with about 4% of normal Butyl Alcohol and a small quantity of an aldehyde. Anæsthetic properties to be attributed to Ether.—H. H. Dale and co-workers.—L. i./23, 424. *See also* B.C.A. '26, A863.

The 'toxicity' which develops in Ether, develops proportionately to the degree of oxidation by exposure to light and air; oxidised Ether, in addition to producing local and necrosing effects, has distinct action on heart and central nervous system. Toxic phenomena due to presence of peroxides. The Anæsthetic Committee of the Roy. Soc. Med. reported (Oct. 1926), 'the purer the Ether, the better the anæsthetic.' Suggested that analyst's certificate of purity should accompany all anæsthetic Ether.—H. E. Laws, L. i./27,789. B.M.J. i./27, 932. *Further data vide Vol. II.*

Effects of Acetaldehyde, Peroxide, Mercaptan and Sulphide.—Jl. Pharm. and Exp. Therap. '26,409.

The rate of formation of peroxide increases greatly as the amount present increases.—F. H. Carr, B.M.J., ii./27,664. *See also* L. ii./27,1305.

Ether Convulsions—a new complication of Ether anæsthesia: 4 fatal and several non-fatal cases reported. Due to presence of impurities, Acetaldehyde and 'peroxide,' in the Ether. Impurities present on delivery and increased in amount by existing methods of Ether administration. Question of Ether purity requires further investigation. Exposure to light and air should be eliminated, and stale Ether should be discarded. Use of amber glass in Ether vapour bottles to protect Ether from theatre lights, and metal tube projecting below level of Ether replaced by bone or ivory. Convulsions treated by prompt ventilation of patient with Oxygen containing 5% Carbon Dioxide.—S. R. Wilson, L. i./27,1119. *See also* L. ii./27,765.

Uses.—Internally Ether is a rapid stimulant in syncope. It carminative. May relieve dyspepsia and asthma. Hypodermically it may save many cases of syncope, collapse, and shock from hæmorrhage and injury. It depresses nerve tissue, in very large doses it tends to depress muscle tissue, including cardiac muscle, but it never excites.

Recoveries from shock by intracardiac injection of Ether. 1 Cc. direct into the left ventricle successful in two cases. Response dramatic and gratifying.—N. Hay Bolton, B.M.J., ii./26,482.

Whooping Cough treated by ether injected intramuscularly in the upper part of the buttock. Supposed to act by combating the spasmodic element of the disease. 1 Cc. up to age of 7 or 8 months, and in older children 2 Cc. repeated daily or on alternate days—not invariably successful.—L. i./21,1311. Most dramatically successful: also useful in broncho-pneumonia.—B.M.J.E. ii./22,49.

Rectal injection of Ether mixed with equal amount of Olive Oil, 1 drachm of the mixture for every year of age, gave good results when combined with drugs, *e.g.*, Belladonna.—C. Elgood, B.M.J., i./25,963.

For general anæsthesia ether produces less depression on the heart than chloroform, but its use is unpleasant both to the patient and to the operators. Its suffocating action on the patient, if suffering from any lung or bronchial affection, is very irritating, and has proved fatal. Care must be taken not to employ it near a light: its vapour is 2½ times heavier than air and very inflammable, and as an anæsthetic it has to be used freely.

Dangers from Ether are usually respiratory and due to excess of saliva; Atropine hypod. before the ether prevents this. Inversion, pulling the tongue and slapping the back usually expels mucus.—R.D.H.

Crile's Nasal Tube method of giving Ether. Less Ether is required than by employing the ordinary way using the open drop method. An injection of Morphine ¼ grain with Atropine $\frac{1}{75}$ grain is given an hour before the operation. Oxygen in addition not found necessary.—L. ii./09,364.

With flannel or with lint in the open method (Skinner's mask), so adjusted that all inspirations and expirations pass through the fabric, a more or less equable atmosphere containing approximately 8 or 9% of ether vapour may be depended upon.—L i./12,217

As an anæsthetic, **rectal use** of Ether is favoured by some, *e.g.*, where presence of the Ether cone over the face would hinder the operation; or, secondly, in diseased condition of the lungs. Contraindicated in diseased state of the intestines and generally in abdominal cases. Several advantages are claimed. It is thought that a definite percentage of Ether in the entire circulation is required to produce complete surgical anæsthesia. In human beings this amounts to a little under six volumes per cent. A mouth tube is sometimes added.

Anæsthesia in throat and nose operations. Ether is thought to be the proper anæsthetic—safer than chloroform.—Felix Rood, L. i./20,433.

Deaths during ether anæsthesia. See Edn. xvii., p. 107. Also Atropine and open Ether, *postea.*

Ether an ideal anæsthetic for squint operations on children. Chloroform so dangerous its use forbidden.—T. Harrison Butler, B.M.J. ii./25,1150.

Sterules of Ether contain half a drachm in each for hypodermic injection as a dose in heart failure. 20 to 60 minims have proved a successful restorative in typhoid fever and for dyspnœa, but *cf. antea.* These are made with 0·735 ether.

Sciatica has been treated by injection of ether with either cocaine or morphine subcutaneously into the sciatic nerve. 5 minim doses of ether with 2 minims of 1 in 12 cocaine, or morphine injection 3 minims, using a 2½ inch needle.

Oxygen and Alcohol administered during anæsthesia by Ether or other Anæsthetics. Apparatus is described by means of which Oxygen is bubbled through Absolute Alcohol, and thence the combined vapour mixes with the anæsthetic in a mask.—L. i./11,331. *cf.* **Oxygen and Alcohol Administration.** The apparatus consists of a cylinder of Oxygen, wash-bottle containing Alcohol with exit tube above leading to a Schimmelbusch mask or Hewitt's modification, which is specially adapted for giving Oxygen with anæsthetics. These are joined together in series in this order.

Prolonged Anæsthesia under Ether alternately with Gas and Oxygen.

Temperature sometimes remains subnormal for many hours. Nitrous Oxide in connection with Oxygen may be more generally used, but it causes inconvenient rigidity, also faintness, dilated heart, persistent vomiting, etc., but by using Ether alternately with 'Gas' and Oxygen these objections in great measure disappear. Rigidity can be entirely avoided. The method consists in anæsthetising the patient with Ether, and when a certain degree of Ether saturation is reached changing to Nitrous Oxide and Oxygen—the latter being again dropped in favour of Ether on certain indications, and so on. The details are—when Ether anæsthesia is thoroughly established Nitrous Oxide and Oxygen in proportion of 96 or 95 to 4 or 5 is given. The corneal reflex, if still present, but dulled before the change, will now be abolished after a few breaths of gas, but the pupil will remain small and colour good. After two minutes or so the Oxygen must be increased to 12, 15 or 20%. Frequent breaths of fresh air are admitted, and generally at the end of five minutes it is advisable to return to Ether. This second Ether will probably extend over five minutes, after which Gas can be given for 10 minutes.

As the operation proceeds the Ether applications become shorter and the intervals between them longer. The anæsthesia is even, and shock during and after operation seems to be very slight. The method is applicable to a large variety of patients and cases. There is a wide margin between light and deep narcosis. Post operative conditions good. Nausea less than after open Ether. Rebreathing was allowed on a few occasions without apparent detriment.

In the discussion it was thought that the amount of Nitrous Oxide necessary must be very great, and hence the method seemed as if it would be cumbersome. The question of post-operative vomiting was fully gone into.—Fleming, R.S.M., Sec. Anæsthetics, Dec. 1910 p. 1, *et seq.*

Gas and Oxygen (1 of Oxygen to 4 of Gas) in nose and throa

work preceded by at most Atropine 1/200 gr. in children, or Morphine $\frac{1}{3}$ gr. c. Atropine 1/150 gr. in adolescents, or Combined Hyoscine, Morphine and Atropine for adults. Only a small amount of anæsthetic or a mixture of Chloroform and Ether (Ethanesal) is needed. —H. E. G. Boyle, B.M.J. ii./21.591.

Gas, Oxygen, Carbon Dioxide, Ether Anæsthesia, with local or regional analgesia and de-etherisation, the nearest approach to the ideal anæsthetic, but requires expensive and complicated apparatus and considerable experience.—J. Ross Mackenzie, L. i./27,164.

The effects of Ether, Chloroform, Ethylene and Nitrous Oxide anæsthetics on the gastro-intestinal tract.—G. H. Miller, Jl. Ph. & Exp. Ther., Feb. '26,41.

Oil of Orange. ***Effect of, on Anæsthesia.***

It is stated that an ounce of Essential Oil of Bitter Orange Peel and 3 ounces of Ether placed in the hot water bottle of Gwathmey's three bottle vapour anæsthesia apparatus, and Ether in the other two bottles, cause not only the odour of the anæsthetic to be completely disguised, so that the patient is unable to tell when its administration begins, but anæsthesia is improved. The result may be due to the pleasant sedative effect.—New York Medical Jl., per Pres.

A further article on the matter by Gwathmey is to the effect that Essence of Orange employed by him is composed of Oil of Bitter Orange Peel 1, Absolute Alcohol 3.—B.M.J. i./17,126.

Atropine and 'open Ether' administration.

An Atropine injection is given 1 hour before the ether to prevent the secretion of mucus in the air passages which may otherwise be caused by ether.—H. Bellamy Gardner, B M.J. i./12,422.

Enucleation of tonsils by dissection is best done under open ether preceded by 1/100 grain atropine. Suitable for all patients from six months upwards. —H. Tilley, B.M.J. i./19,781; ii./19,27. (A death under C_2E_3 and C_3E_1—H. S. Gabbett. *ibid* i/19. 739.)

Morphine and Atropine in the usual hypodermic dose do not affect kidney functions unfavourably, and given prior to Ether anæsthesia they prevent inhibition of kidney function and should therefore be of value in urologic surgery.—W. H. Haines and L. F. Milliken, Jl. A.M.A. ii./25,1855.

Anæsthesia. A modification of the open ether method.—F. W. Silk, B.M J. i./19 635.

Crile's method of shockless surgery.—It consists of (1) a preliminary injection of Scopolamine to allay the patient's fear of the impending ordeal; (2) general anæsthesia with Ether, followed by (3) local anæsthesia with Novocain 1 in 200 combined with Adrenalin at the site of incision, and Quinine-urea-hydrochloride 0·75% solution into the peritoneum in cases of gastro-enterostomy The object being to keep the brain free from shock before, during and after the operation.—W. I. De C. Wheeler, M P.C. i./14,332.

Ether Infusion Anæsthesia by means of Saline Solution.

Burghardt, the originator of the method of Infusion Anæsthesia, used an ordinary infusion apparatus containing a 5% solution of ether in normal saline. The present method is a modification of the above. An hour before the induction a hypodermic injection is given which consists of (in the case of a fairly robust adult) Scopolamine $\frac{1}{100}$ grain, Morphine $\frac{1}{6}$ grain, and Atropine $\frac{1}{100}$ grain (other cases according to age and condition of patient, etc.) The patient being on the operating table, the selected arm is bandaged to a splint, vein exposed (a few drops of eucaine may be used)—cannula tied in and the solution run in rapidly. Induction usually lasts about ten minutes. The apparatus used consists of a reservoir containing a 5% solution of ether in normal saline fixed about 8 feet above the floor level, the solution by means of a pipette drips into an indicator (capacity 8 ounces) fixed below this and from thence into a warming chamber to which the cannula is attached The apparatus is controlled by a single tap placed just below the indicator. This tap, controlling the drips of the solution, affords an excellent index of the rate at which the solution is entering the vein.

The advantages claimed for this method of anæsthesia are the following:—

Surgical anæsthesia may be attained with 8 ounces of the solution, while for maintenance of the anæsthesia one pint an hour (1 ounce of ether) is in most cases enough. Great flexibility, patient can be adjusted with grea nicety. Patient comes round within a few minutes. Post-anæsthetic vomitin and pulmonary irritation are both rare.—F. Rood, B.M.J. ii./11,974.

Solubility of Ether in Normal Saline.—At 15° C. 11·87 Cc. of 72 Anæsthetic Ether dissolve in 100 Cc. of Normal Saline (of strength 0·91% NaCl by weight).—R. R. Bennett, P.J. ii./12,146.

Ether Saline infusion compares favourably with other methods —5, 6 or 7% can be safely used. A 10% solution may produce hæmoglobinuria It i best to begin with 5%. The method is suitable even for the old and feeble Recovery is rapid and post-anæsthetic vomiting rare.—F. Rood, B.M.J ii./12,608; L. ii./12,1801. D. W. Buxton's "Anæsthetics," 6th Edn.

Strength 7½% and amount raised from 200 to 600 Cc. given in 3 to minutes. In one case over 2 litres of the Solution were given.—G. A. H Barton, B.M.J. ii./12,610.

An apparatus described for giving.—E. G. Schlesinger, L. ii./12,1226.

Satisfactory results in 170 cases from intravenous use.—Pres., Jan. '23,5.

Scopolamine-Morphine Atropine with Ether Saline.—

Scopolamine (1/100 grain) with Morphine (1/6 to 1/4 grain) and Atropin (1/100 grain), given about ¾ hour before operation—under 5% Ether Saline The combination is very useful, as the amount of Ether is reduced to a mini mum. It is especially suitable for head, throat, etc., operations, as th anæsthetist is not in the way. The patient is spared the disagreeable sensa tions of inhalation method. No irritation of the respiratory organs; n after effects.—F. L. Napier, Glas. Med. Jl., July, 1912.

For a further method of Intravenous Anæsthesia see Paraldehyde

Intramuscular Etherisation.—

Ether injection into the buttocks, 0·45, 0·8 and 0·8 Cc. respectively adminis tered to three patients. In the first Ethyl Chloride was necessary, and i the second and third Chloroform to hasten anæthesia. Another operato found that he failed to induce anæsthesia, though 60 to 70 Cc. in 10 Cc. dose were injected. The patient was drunk in consequence 24 hours, and becam very excited.—L. ii./12, 1802.

Intramuscular injections of Ether to produce general anæsthesia. Succes sive injections of 2 to 5 Cc. into gluteal region—into each side alternatively Amount used roughly 1 Cc. per kilo body weight. Advantage in head an neck operations.—B.M.J. ii./13,394.

Intramuscular slow injection of Ether as anæsthetic; 5 Cc. every fe minutes.—20 to 30 Cc. usually sufficient. Used in oto-rhino-laryngology —B.M.J.E. ii./21,79.

Intratracheal Insufflation of Ether.—

Almost incredible operations have been done with this method on dog *e.g.*, complete removal of one or more lobes of the lung, complete division an suture of the thoracic œsophagus and complete division and suture of th transverse arch of the aorta. Employed in 25 cases with success.—B.M.. ii./12,112; ii./13,393, 1621.

The method will maintain anæsthesia after it has been established by th usual manner. A tube ¾ of the diameter of the trachea is introduced int it nearly to its bifurcation. A fairly rigid silk woven catheter 30 Cm. lor is used—the average size for an adult being No. 21 or 22 French. Th warm anæsthetic—Ether, or a mixture of Oxygen and Ether—is introduced b means of a pump or mechanical blower,—Elsburg's Apparatus is probab best. By this means respiration with full aeration persists, but with lessene respiratory movements.—D. W. Buxton's "Anæsthetics," 6th Edn.

The method of choice for all operations on head, nose, mouth, and throa where satisfactory anæsthesia cannot be maintained with a free airway l the ordinary methods without inconvenience to the surgeon. When the is blood in the upper air passages it is a necessity.—S. Rowbotha L. ii./26,584.

Pharyngeal Insufflation Anæsthesia is a method of prolonging Eth anæsthesia after it is established by ordinary methods. The vapour is giv through the nose by means of Crile's tubes, the mouth and nasopharynge space having been previously carefully cleansed.—D. W. Buxton's "Ana thetics," 6th Edn.

Oil-Ether Anæsthesia. *Syn.* COLONIC ABSORPTION.—A mixture of Olive Oil and Ether in definite proportion and amount slowly introduced *per rectum*. An evolution of Intravenous Anæsthesia.

For children under 6 a 50% solution is used, allowing 1 ounce for every 20 lbs. of body weight. This is non-irritating and no preliminary medication is wanted. Between 6 and 12 years use 55 to 65% solution without preliminary medication. Keep the patient quiet and allow 20—30 minutes for the full effect. Use 1 oz. for every 20 lbs. body weight as before. Between 12 and 15 years use the same percentage and amounts with possibly the addition of 1/12 grain Morphine and 1/200 grain Atropine hypodermically as a preliminary. From 15 years upwards a 75% mixture is used with same amount as before—1 oz. to every 20 lbs. It will be seen, therefore, that for an *adult* weighing about 160 lbs., 8 ozs. of the mixture would be wanted (*i.e.*, Ether 6 ozs. and Olive Oil 2 ozs.). The 8 ozs. should be passed in slowly, *i.e.*, it should take 5 minutes. **A maximum strength of 65 % is now advised by Gwathmey.—D. W. Buxton's "Anæsthetics."**

The method is claimed to be perfectly safe. The anæsthesia is automatically safeguarded by the gradual and equal absorption of the Ether from the colon, and at the same time its rapid evaporation from the lungs. A further reason for the safety is the affinity of the Oil and Ether for each other.—J. J. Gwathmey, L. ii./13,1756.

The administration of Ether vapour *per rectum* has been employed and found to answer admirably for operations about the mouth, nose and post-buccal cavities. D. W. Buxton's apparatus consists of an Ether receiver holding 2 or 3 ounces and surrounded by a vessel containing water kept at 120° F. The vapour is conveyed to the rectum by a tube which has a glass intercepting drip chamber to prevent the passage of any liquid Ether which would be liable to cause dangerous results.—D. W. Buxton's "Anæsthetics," 6th Edition. See also B.M.J.E. i./15,46.

Ether (4 ounces) and oil (2 Ounces) as anæsthetic per rectum in diverse operations with success.—H. M. Page and G. B. Mower White, L. ii./17,643.

125 cases operated on under rectal anæsthesia (Ether and Olive Oil). Has many advantages over inhalation, *e.g.*, ease of administration, absence of apprehension in patient, and of coughing, retching, and straining, reduction of shock, and absence of post-operative vomiting.—R. D. Laurie, B.M.J ii./25,1123.

Chloretone 0·3 to 1·5 Gm. is given per rectum and after ½ hour Morphine and Atropine hypodermically. Twenty minutes later, Oil-Ether in proportion of 3 of Ether to 1 of oil (but this may be varied) is run into the colon slowly by catheter and funnel, one minute being allowed for each 30 Cc. The amount used is approximately 3 Cc. per kilo body weight. Should never exceed 250 Cc. For head and neck operations.—A. E. Boyd, Dublin J. Med. Sci., May '20, p. 121, per Pres., Feb. '21,37.

Rectal anæsthesia. Mixture used, 3 parts ether to 1 of olive oil. One ounce of the mixture for every 20 lbs. of body weight. About 8 ozs. a maximum dose (*i.e.*, 6 ozs. of ether). Administration to take about 20—30 minutes.—R. B. Coleman, B.M.J. i./26,943.

Rectal Ether anæsthesia the safest and most effective method for relief of pains of childbirth, over a period of hours, so far devised. Greater applicability than Scopolamine amnesia, and does not require trained anæsthetist. Quinine an essential ingredient. Uterine inertia the only contraindication; The woman must be in active labour.—J. R. Harrar, Am. Jl. Med. Sci., per Jl. A.M.A. ii./25,1160.

Synergistic Method of Painless Childbirth (Rectal Ether Analgesia)—Gwathmey and others.

This method depends on the supposed synergistic action of Magnesium Sulphate and Ether, much smaller doses of both being necessary than when either is used alone. In obstetrics, when the *os* will admit three fingers, 0·006 Gm. (1/10 grain) Morphine in 2 Cc. of a 50% solution of **Magnesium Sulphate** is injected intramuscularly. The injection is repeated in two or three hours if the pain is not relieved. At the same time, an **Enema** composed of Ether 70 parts, Alcohol 8, Quinine Hydrobromide 0·6, and Olive Oil to 120 parts, i administered. Sometimes a mixture of Ether 90 and Chloroform 10 is used instead of Ether alone. Forty-seven patients had painles labours; 13 were fairly free from pain; while 7 failures were du to giving the drug too early in labour. The failures emphasised th short duration of anæsthesia—4 to 5 hours. No bad effects wer noted on either mother or child.—Adler, 'Anæsthesia in Obstetric and Gynæcology,' Wien. Med. Woch., '26, May 8.

The following are modifications :—

Preliminary high soap-suds enema followed by rectal irrigation of tepi water until return is absolutely clear. Patient placed in quiet room, eye covered and ears closed with cotton. When *os* will admit 2½ or 3 fingers with contractions at 6 to 7 minutes interval, of duration of 10—12 seconds inject 2 Cc. 50% solution Magnesium Sulphate, combined with ¼ grain Morphine Sulphate intramuscularly, injection being given during one of th uterine contractions. If no effect within 20 minutes, repeat Magnesiun Sulphate injection without Morphine. After the slight drowsiness, patien receives retention **Enema** of 20 grains **Quinine Alkaloid, Alcohol** 4 minims, **Ether** 2½ ounces, and **Olive Oil** to 4 ounces. Lubricate rectur and anal region, and warm mixture, which should take 10—15 minutes t empty. Rectal tube must not be inserted during uterine contraction. Patien becomes drowsy, and must not be disturbed for 2 or 3 hours, but should b carefully watched, as precipitate delivery often occurs. If no analgesi follows enema, a third injection of Magnesium Sulphate may be given a hour after. Effect of procedure lasts about 4 hours, and if patient is no then ready for delivery the whole treatment may be repeated, leaving ou the Morphine.—D. Deutschman, M.J. & R., Oct. 6, '26,421—425.

From a further account, with approximately identical formula a the last-mentioned for the enema, we take the following :

A second or even third instillation (enema) may be given at intervals 3 hours or more, but only 10 grains Quinine Alkaloid is used in these instilla tions, which are accompanied each time by a further intramuscular injectio of 2 Cc. 50% Magnesium Sulphate solution.

Great relief is given in 85% of cases and more or less relief in 10%. I is not claimed to give painless childbirth, but gives relief in the agonisin part of the ordeal. No ill-results to mother or child. 5,800 cases treate with satisfactory results.—J. A. Harrar, Am. Jl. Obstet. & Gynec., Apri '27,486—491.

A paper to prove that Gwathmey's contention that synergism takes plac between Magnesium Sulphate and Morphine is erroneous, and that no sati factory evidence has been brought forward to show that this synergism do occur in man. The results of dog experiments are produced in suppo of the argument—H. Beckman, Jl. A.M.A. ii./25,332—336. Gwathme replies and produces extensive clinical evidence to prove that this synergis *does* occur in man—*ibid.* ii./25,1482.

Anæsthesia by **Oral Administration** : Ether 50% in Liquid Paraffin 1 2 ounces effectual in 90 seconds—probably the safest general anæsthet and not followed by nausea. A little anæsthetic by inhalation may be want in addition. The dose may be sandwiched between mouthfuls of Port Wi Useful for dressing wounds.—J T. Gwathmey and H. T. Karsner.—B.M. i./18 254.

APPLICATION OF ETHER TO WOUNDS employed in such inflammatory aff tions as peritonitis, periostitis, etc. Ether compresses considerably relie the congestion.—M.P.C. ii./11,377.

Wounds have been swabbed out thoroughly with Ether (without wate solution beforehand).—B.M.J. i./15,898, also irrigated with 2% of Ether lukewarm water with benefit.—A. Distaso and T. R. Bowen, B.M.J. i./17,25

Infected wounds treated with Ether as antiseptic dressing. There was sign of infection throughout the process nor rise of temperature.—B.M.J. ii./15.41.

Also by the Carrel-Dakin method of irrigation but it is costly and causes intense cold.—B.M.J. ii./17,598.

BRONCHITIS (post-operative). Intramuscular injection of 0·5 Cc. Ether in 0·5 Cc. Olive Oil, with the addition of a local anæsthetic gave good results. One such injection daily recommended in every case of acute or chronic bronchitis without emphysema.—per Jl. A.M.A. ii./25,157.

OTITIS MEDIA, suppurative, treated by Ether which is run into the affected ear and allowed to evaporate. In the cases not relieved chronic mastoiditis was revealed by X-rays.—Med. Jl. & Rec., Apl. '26,503, per Pres., Feb. '27,64.

Ether is used as a menstruum and vehicle for skin medication, on account of solvent action on sebaceous secretion. Ethereal Tinctures and Solutions of Belladonna, Capsicum, Iodine, and Menthol are prepared.

Preparations.

Perles of Ether, 3 minims in each. *Dose.*—1 to 4.

Spiritus Ætheris (*B.P.* '14). Ether 1, Alcohol (90%) 2.

Dose.—60 to 90 minims (4 to 6 Cc.), or 20 to 40 minims (1·2 to 2·5 Cc.), repeated.

The older formula is occasionally prescribed, viz. :—

Spiritus Ætheris Compositus (B.P. '98.).

Syn.—HOFFMANN'S ANODYNE, Liquor Hoffmanni, but the simple Spirit of Ether is now called Hoffmann's Anodyne abroad.

Mistura Ætheris cum Ammonia (*Martindale*). *Dose.*—1 to 2 ounces. Spirit of Ether 3, Aromatic Spirit of Ammonia 3, Water to 48. St. Th. H. terms this 'Patent'; with 1 grain of Camphor to the ounce 'Camphorated Patent.' A rapid stimulant. Gt. Orm. H. has Spirit of Ether 3½ minims, Aromatic Spirit of Ammonia 3½ minims, Tincture of Orange 2 minims, Chloroform Water to 1 drachm. Suitable for a child one year old.

Ⓟ **Lotio Ætheris Composita.**

Hoffmann's Anodyne 250, Ammonia Solution 4, Distilled Water 25, Pilocarpine Hydrochloride ½; Spirit of Lavender 25. For hair falling off, applied with friction, after washing with soap.—B.M.J.E. ii./09,24. *Caution: Inflammable.*

Spiritus Ætheris Nitrosi (*B.P.* '14).

Dose.—15 to 60 minims (1 to 4 Cc.).

An alcoholic solution containing ethyl nitrite (1·52 to 2·66% by weight), aldehyde and other substances.

For the Decomposition and Volatilisation of this preparation on storage, see Vol. II.

Uses.—Antipyretic, diaphoretic, diuretic, and stimulant. Relieves the spasm and pain of asthma, dysmenorrhœa, angina pectoris; also the pain of the passage of renal calculi and gall stones.

Spiritus Æthylis Nitritis. U.S. requires 3·5 to 4·5% ethyl nitrite.

Incompatible with Potassium Iodide (*cf.* Vol. II.), also with Phenazone unless previously neutralised with Sodium Bicarbonate; also incompatible with Salicylates and Ferrous Sulphate.

Ethyl Nitrite is the active ingredient; the other ingredients (Aldehyde, Ethyl Nitrate, Alcohol) play a subordinate part and of little practical importance. As there is a rapid loss of Ethyl Nitrite on mixing with water, it is best prescribed as such to be diluted just before use.—C. R. Marshall and E. Gilchrist, B.M.J. ii./15,125.

Any loss of strength in this is generally due to volatilisation of the Ethyl Nitrite alone. Only direct sunlight has any effect in inducing decomposition, and this can be prevented by storing in amber bottles with greased stoppers. —R. Wright, P.J. i./26,256.

It is stated that it does not affect the kidneys nor the sweat glands; it is neither diuretic nor diaphoretic.—P.J. ii./10,298.

***Itrosyl** (T.M. 177631).—A preparation for making Spirit of Nitrous Ether. Dilute the contents of one ampoule with 19 ounces of 90% Alcohol.

Liquor Ethyl Nitritis. **Solution of Ethyl Nitrite** (*B.P.* 14).

Dose.—15 to 60 minims (1 to 4 Cc.). Should be directed to be added to a small quantity of water at the time of taking.

A mixture of Absolute Alcohol 95 and Glycerin 5, containing in 100 parts by volume, 3 parts, or not less than 2½ parts by weight of Ethyl Nitrite (obtained by the interaction of alcohol, sodium nitrite, and diluted sulphuric Acid, at a low temperature). Store in small bottles. Sp. Gr. 0·823 to 0·826. It keeps better than the Spirit.

The circulation is distinctly affected by a fraction of a minim, yet large quantities do not cause death.—Leech.

Æther Aceticus. Acetic Ether. (*B.P.* '14).—Consists principally of ETHYL ACETATE. $CH_3.COO.C_2H_5$=88·064. FR. CX., etc.

Dose.—45 to 60 minims (3 to 4 Cc.) or 15 to 30 minims (1 to 2 Cc.) repeated. Sp. Gr. 0·900 to 0·907. Not less than 90% pure. Boils between 165° and 172° F. (73·9° and 77·8° C.). Was used in preparing Liquor Epispasticus, and is inhaled for laryngeal catarrh, ½ drachm to the pint of warm water.

Soluble in all strengths in Alcohol and Ether, and about 1 in 11 of water.

Dimethyl Ether. $CH_3.O.CH_3$=46·048. A gas at n.t.p. Boils at 24° C. and at 100°C. exerts a pressure of 97 lbs. to the square inch. It can be safely compressed into cylinders. The gas condenses into a thin mobile liquid, with slightly ethereal, pleasant odour. Used as an anæsthetic.—L. ii./23,1302

ÆTHYL CHLORIDUM.

Ethyl Chloridum (*B.P.* '14), P.G. VI., U.S. X. C_2H_5Cl=64·497.

Syn. CHLORYL ANÆSTHETIC. *KELENE (T.M. 414307).

Dose.—A good average for an adult by inhaler is 5 Cc.

Using a Rendle's mask—by the 'open' method which is thought preferable to one involving the breathing and rebreathing from a closed bag of vitiated air, 7 to 8 Cc. are advised as adult dose, 5 Cc. for children of 7 to 12 years. Cyanosis and subsequent discomfort is certainly less. The anæsthesia may be prolonged by removing the mask and spraying more on the sponge.

Manufactured by the action of hydrochloric acid on absolute ethyl alcohol. If made (*B.P.* '14) from Industrial Methylated Spirit will contain a small amount of Methyl Chloride. Tested (*B.P.* '14) to contain 99·5% Esters calculated as C_2H_5Cl.

At ordinary temperatures this is gaseous, but condenses into a colourless mobile liquid with a sweetish burning taste. Slightly soluble in water, readily in alcohol. Sp. Gr. 0·920 to 0·960 (U.S. about 0·921) at 0° C. (*B.P.* '14). On account of its low boiling point (about 50 °F.) and the intense cold produced by evaporation, it s useful as a local anæsthetic in minor surgery, also for neuralgia. The part should be washed with soap and then with alcohol or ether before applying. In dental cases the patient is instructed to breathe through the nose during operation, the part is well dried, and other parts protected. Its vapour is inflammable.

For inducing general anæsthesia, it is described as pleasant; is taken readily by children and adults, with few or no after effects. Probably within the limits for which it is intended it is safer than any other anæsthetic excepting nitrous oxide. It has the advantage of requiring no complicated apparatus. A closed mask must not be used. It is quicker in action than ether.

To prolong the anæsthesia induced by ethyl chloride, chloroform has been advised as best. Ethyl Chloride (and Ethyl Bromide) are said to stimulate the heart, not to depress it as chloroform does.

Open Ethyl Chloride a very convenient method of induction—portable, easy to patient, rapid in action, and safer than Chloroform. Useful for enucleation of tonsils, circumcision, and other minor operations, as also for major operations.—J. Ross Mackenzie, L. i./27,165.

Bulbs for general anæsthesia (large spray) contain 3, 5, 7, and 50 Cc. **Tubes** for local use 10, 15, 30 and 50 Cc. with screw or auto-stopper. **Bottles** for local or general anæsthesia 60 and 100 Cc. These 60 Cc. bottles are the most convenient for use. **Metal Cylinders** contain 55 Gm., 110 Gm., 1000 Gm.

Instructions for treatment if dangerous symptoms arise in administration—

Ethyl Chloride, or Somnoform. — See that the airway is clear and the clothing loose, and begin artificial respiration at once. Weak ammonia vapour may be held to the nostrils. Hot flannels should be placed over the heart, and chest smacked with a towel wetted in cold water. Artificial respiration must be kept up for at least an hour. The patient must be kept warm.

For R.D.H. method proceed as under Chloroform.

For tonsils and adenoids Ethyl Chloride is as safe as Ether. No death from it recorded.—C. B. Dale, B.M.J. ii./19,616; G. A. H. Barton and others, *ibid*, 690; L.B.C. Trotter entirely disagrees, *ibid*; 'not very safe.'—D. W. Buxton, *ibid*. 725.

Skin frozen *around* area of operation—little pain.—Pres., Jan. '23,6.

RINGWORM well treated by Ethyl Chloride after washing with Sodium Bicarbonate and Spirit of Ether.—L. i./14,242. Patients to attend six mornings a week for at least two weeks. Useful and reliable.—M. W. Geffen, B.M.J. i./22,267.

WARTS have been treated with Ethyl Chloride—one application is sufficient if small, and for large warts at intervals of a week.

***Dridustsol** (T.M. 384131) solutions in Ethyl Chloride of various *medicaments*, *e.g.* **Amyl Salicylate, Ethyl Salicylate, Methyl Salicylate** *aa*. 2%, [D][P1]**Cocaine** 1%, **Menthol** 5%, **Benzoic Acid** 2%, **Salicylic Acid** 2%, **Cresol** 2%, **Formaldehyde** 1%, **Guaiacol** 2%, **Iodine** 3% **Iodoform** 2%, **Naphthol** 2%, **Phenol** 2%, **Resorcin** 2%, **Picric Acid** 2%, **Mercuric Oleate** 1%, for spraying for antirheumatic, anæsthetic, and antineuralgic effect, for use in skin affections, and **Pyridine** 2% for inhalation. The spray is used at not less than 65° F. (18° C.) at a distance of 2 feet and deposits the medicament in a fine dry adherent powder or coating on the skin.

Somnoform is said to be a mixture of Ethyl Chloride 60%, Methyl Chloride 35%, and Ethyl Bromide 5%. 60 Gm. glass tubes with "valve stopper" for inhalation as an anæsthetic in dentistry. **Glass Capsules** contain 3 and 5 Cc.

If **dangerous symptoms** arise in administering proceed as directed under ethyl chloride. In using, respiration must be watched carefully.

ÆTHYL IODIDUM.

Ethyl Iodide.—*Syn.* HYDRIODIC ETHER. $C_2H_5I=155{\cdot}972$.

May be obtained by distilling a mixture of alcohol, iodine, and phosphorus. A colourless liquid (but liable to become coloured by setting free iodine). Of a penetrating odour; boils at 148° F., has Sp. Gr. 1·94; is not inflammable. *Soluble* 1 in 400 of water, and miscible with alcohol and ether in all proportions.

Uses.—It is useful *inhaled* as an anæsthetic to relieve the dyspnœa of bronchitis. As it contains four-fifths of its weight of iodine, it forms a rapid means of saturating the system with this element; iodine can be detected in the urine 10 minutes after inhalation, and as long as 30 hours after; it neither impairs appetite nor weakens digestion.

In bronchial catarrh it induces sleep and promotes expectoration when inhaled. It is useful for inhalation in œdema of the glottis from catarrhal laryngitis. It acts as an antispasmodic in angina pectoris, spasmodic asthma and certain forms of nervous dyspnœa.

Internally Ethyl Iodide is found useful in bronchitis, asthma, rheumatism, and for secondary syphilis.

Externally 10 to 20% ointment with **paraffin basis** may be used (stronger may blister).

General iodization may be produced by painting the iodide on the calf of the leg or between the shoulders, and covering with impermeable dressing. The system may be saturated with Iodine in this way.—Whitla. In angina pectoris. inhalation of Ethyl Iodide useful, action thought to be due to liberation of free iodine which is rapidly absorbed by the blood.—Yeo.

Measurement of Heart Efficiency.

Even when only minute amounts of Ethyl Iodide are contained in the air the amount of vapour can be determined by the use of Iodine Pentoxide to liberate Iodine. Ethyl Iodide is decomposed in the tissues, presumably into Sodium Iodide and Alcohol. The volume of circulation is determined by the subject inhaling a mixture of a few drops of Ethyl Iodide in 100 litres of air, the expired air passing through a mixing chamber. A sample of alveolar air is collected. This and equal volumes of the inspired and expired air are assayed. The circulation is found by the formula: Volume of air breathed per minute is multiplied by the difference in the amount of Ethyl Iodide in the inspired and expired air, and is divided by twice the amount found in the alveolar air.—Prof. Y. Henderson, L. ii./25,1317; see also *ibid.* 1343.

Ethyl Iodide Sterules.

Encased in cotton wool and silk, containing 5 minims in each. The sterule is snapped, the fluid absorbed by the wool, etc., and inhaled for four or five minutes for spasmodic affections. This may be repeated three or four times a day. The patient requires no assistance, and can take one of the sterules from the bedside, in the dark if necessary.

In whooping-cough they have been found useful—the coughing fits are rapidly reduced.

Ⓟ**Ethyl Iodide and Chloroform Sterules** contain 5 minims of Ethyl Iodide and 10 minims of Chloroform, and are of the greatest service in the relief of asthma and whooping-cough.

Ⓟ**Ethyl Iodide, Chloroform and Menthol Sterules** as the last mentioned, with Menthol 1 grain in addition, are also made for use in bronchial affections.

Compound Ethyl Iodide Capsules L.H. contain these ingredients but $\frac{1}{8}$ grain only of Menthol.

Methyl Iodide. $CH_3I = 141{\cdot}956$.

A colourless liquid (when first made) boiling at 44° C. Sp. Gr. 2·285. As a vesicant is even more powerful than Cantharides.

Blisters may be produced in a few hours by rubbing in 15 to 20 drops.

ALCOHOL ÆTHYLICUM.

($C_2H_5OH = 46{\cdot}048$).

Together with notes on ALLYL, AMYL AND METHYL ALCOHOLS.

Alcohol Absolutum (*B.P.* '14). **U.S.**, FR. CX., P.G. VI.
Syn. ETHYLIC ALCOHOL, B.P. 1885.

Ethyl hydroxide, with not more than 1% by weight of water. Sp. Gr. 0·794 to 0·7969 representing 99·95% by volume and by weight to 99·4% by volume or 99% by weight.

FR. CX.—Sp. Gr. must not exceed 0·79683 at 15° C. Ph. Ned. V. allows 2% Water.

Addition of Glycerin, one part to three of Alcohol, with subsequent distillation, is a rapid method of dehydrating, better than Calcium Oxide, Alcohol 99.5% being easily recovered. Obviously, the Glycerin residue can be dried and used again.—P.J., ii./27,590.

Alcohol (90% by vol.)—(*B.P.* '14). *Syn.* **Spiritus Rectificatus.** SPIRITUS VINI. **P. Austr.** 'SPIRITUS,' **Ph. Ned. V.**

Contains 90% by volume, or 85·68% by weight, of Ethyl Hydroxide Sp. Gr. 0·8337. Strength 57·80° O.P. (*i.e.*, 100 volumes contain the same quantity approximately of Ethyl Hydroxide as 157·8 volumes of proof spirit). It is generally manufactured commercially of higher alcoholic strength, *i.e.*, about 70° O.P., Sp. Gr. 0·809, containing nearly 95% by weight of Ethyl Hydroxide, and is diluted as required.

'**Alcohol**,' **U.S. X.** has Sp. Gr. 0·816 at 15·56° C. (0·809 at 25° C.), and contains 94·9% by volume (92·3% by weight) of Ethyl Hydroxide. Alcool Ordinaire (officinal) FR. CX. has Sp. Gr. 0·81602 at 15° C., and contains approx. 95% by volume (92·43 by weight).

Diluted Alcohol (*B.P.* '14). *Syn.* **Alcohol Dilutum.**

Including Alcohol (90%)—see above—there are official five strengths, or "several degrees of dilution," of Ethylic Alcohol, four of which are directed to be prepared from the Alcohol (90%), and contain respectively 70, 60, 45, and 20% by volume of Ethyl Hydroxide.

For Alcohol Dilution Tables see Vol. II

Alcohol Dilutum, U.S. 41·5% Absolute Alcohol by weight (48·9% by volume).

Note.—U.S. X. orders on occasion a mixture of 'Alcohol' (94·9% by vol. 3 parts and water 1 part as menstruum in making Tinctures and Fluid extracts. This is approximately equivalent to 70% by volume.

Spiritus Tenuior, Proof Spirit. B.P. 1885, contained 57% Ethyl Hydroxide by volume=49% by weight. Sp. Gr. 0·920 Prepared by mixing 5 volumes rectified spirit, Sp. Gr. 0·838, with volumes of distilled water, the contraction being about 2·5%.

The greatest contraction occurs when quantities are in the proportion o 3 molecules of water and 1 of alcohol.—Tests, &c., P.J. i./07,404.

The addition of 100 to the number of degrees "overproof" give the number of proof gallons, thus 100 gallons of 56 o.p. spirit = 156 proof gallons.

Immature Spirits (Restriction) Act, 1915.

1. (*a*) No British or foreign Spirits shall be delivered for hom consumption unless they have been warehoused for at least 3 years

Provided that—(*b*) This restriction shall not apply (i.) to spirit delivered to a licensed rectifier, to a manufacturing chemist, c to a manufacturer of perfumes or to other persons licensed b Customs & Excise (ii.) to spirits delivered for scientific purposes.

2. Nothing in this section of the Act shall interfere with th supply of Rectified Spirits of Wine for the purpose of making medi cines to registered medical practitioners, to hospitals and to person and firms and bodies Corporate entitled to carry on the busine of Chemist and Druggist.

Duty and Rebate to Chemists.

The following table shows the alterations in Excise duty on spir since 1908.

In April 1909 the duty was increased to 14/9 per Pf. gallon (from 11/-)
In May, 1915 ,, ,, ,, 16/3 ,, ,, an increase 1/6 over 14/
In April, 1918 ,, ,, ,, 31/6 ,, ,, an increase 16/9 over 14/
In May, 1919 ,, ,, ,, 51/6 ,, ,, an increase 36/9 over 14/
In April, 1920 ,, ,, ,, 74/- ,, ,, an increase 59/3 over 14/

At the time of going to press (1928) *with this edition there has been further change.*

A ***Rebate*** of the various increases shown above as charged the Excise authorities over the old 1909 duty of 14/9 is allowe to duly qualified Medical Practitioners, duly registered Pharmace tical Chemists and Chemists and Druggists on all Duty-paid spi used by them in preparations recognised as *medicines* by the Custom and Excise authorities. The Rebate is not allowed on Tinctu of Orange, Spirit of Peppermint, Mouth washes and the like. complete record of spirit so used must be kept, and claims for reba must be made to the local Customs and Excise authorities f periods covering not more than 3 months since the spirit was used- a minimum period to claim for is one month. The present increa of 59/3 per proof gallon over the old 1909 duty of 14/9 is equivalent to £4 13s. 7d. per bulk gallon of S.V.R. 90%, 58 °/ₚ.

A *Stock Book* has to be kept for obtaining rebate (a well-arranged one is issued by Messrs. Fletcher, Fletcher & Co., Holloway), showing the date, bulk quantity, strength and proof quality of each consignment of spirit received and the details of use.

Quite recently a *Spirit Rebate Book*, containing Records of Spirits received and used and notes for making claims for rebate and Rules governing Repayment, has been issued by the Retail Pharmacists' Union, 4 and 5 Queen Square, London, W.C. 1.

F. C. J. Bird issued a set of Tables (C.D. Dec. 27, '19) for naking the claims for repayment in question. Claims must be xpressed in "proof" gallons to the second place of decimals. The following taken from the paper are useful:—

Proof Spirit Conversion Factors.

METRIC MEASURE.

Litres to Gallons—multiply by 0.2199.

To express:—

Litres of	90%	Alcohol B.P. in PROOF GALLONS..	Multiply by	0·3471
,,	70%	,, ,, ,, ..	,,	0·2697
,,	60%	,, ,, ,, ..	,,	0·2312
,,	45%	,, ,, ,, ..	,,	0·1733
,,	20%	,, ,, ,, ..	,,	0·0767
		IMPERIAL MEASURE.		
Gallons	90%	Alcohol B.P. in PROOF GALLONS..	Multiply by	1·5779
,,	70%	,, ,, ,, ..	,,	1·2263
,,	60%	,, ,, ,, ..	,,	1·051
,,	45%	,, ,, ,, ..	,,	0·7877
,,	20%	,, ,, ,, ..	,,	0·3487
Pints	90%	,, ,, ,, ..	,,	0·1972
,,	70%	,, ,, ,, ..	,,	0·1533
,,	60%	,, ,, ,, ..	,,	0·1314
,,	45%	,, ,, ,, ..	,,	0·0984
,,	20%	,, ,, ,, ..	,,	0·0436
Ounces	90%	,, ,, ,, ..	,,	0·00986
,,	70%	,, ,, ,, ..	,,	0·00766
,,	60%	,, ,, ,, ..	,,	0·00656
,,	45%	,, ,, ,, ..	,,	0·00492
,,	20%	,, ,, ,, ..	,,	0·00218
Drachms	90%	,, ,, ,, ..	,,	0·001233
,,	70%	,, ,, ,, ..	,,	0·000958
,,	60%	,, ,, ,, ..	,,	0·00082
,,	45%	,, ,, ,, ..	,,	0·000615
,,	20%	,, ,, ..	,,	0·000272

QUANTITY OF SPIRITS WHICH MAY BE SOLD BY A CHEMIST WITHOUT LICENCE.

In view of the Immature Spirits (Restrictions) Act, 1915, the Commissioners f Customs and Excise reduced the quantity of duty-paid Spirits of Wine including Absolute Alcohol), which may be sold without a licence, to 5 *ounces uid.* Strict inquiries should be made by the pharmacist as to requirements.—.J.i./22,505.

ENERAL REFERENCES TO TREATMENT, ETC., WITH ALCOHOL

Physiologically it is narcotic and antipyretic, not stimulant.

1½ ounces of pure alcohol is all that can be utilised as a food in the human ody per diem = 3 ounces of brandy and whisky = 7 ounces sherry = 15 unces champagne, claret and white wines.

Even in small quantities is injurious to the proper working of the brain ictor Horsley).

In favour of Alcohol in moderation. The 'power of unlocking energy exerted by Alcohol' is one of the themes.—Charles Mercier, L. ii./12,1492.

90% of the crime of this country depends upon intemperance.—Lord Alverstone, L. i./13,197. See also *ibid.* 1351, 1503; B.M.J. ii./12,1557; Sweden's Gothenburg System, ii./13,1107.

Fatigue and alcohol. Review of labour conditions in various trades. Effects of alcohol worse than useless.—A. F. S. Kent, L. ii./17,107.

Champagne injections in Surgical Shock. Transfer contents of a small bottle (about 400 Gm.) into an ordinary 500 Gm. serum bottle and add Normal Saline 100 Cc. Inject subcutaneously in the normal manner and repeat in six hours if necessary. If a prompt evacuation of the bowels is required give an injection of Pituitary Extract and if necessary repeat in three hours. Valuable in certain cases of pneumonia, influenza, etc.—L. i./13, 1416.

Alcohol Injection in Neuralgia.

Intractable trigeminal neuralgia or tic doloureux has been treated by Alcohol injections (80% usually employed) around the supraorbital notch, 112 cases. Give Hyoscine 1/150 grain and Morphine ⅙ grain 20 minutes in advance. Prior to the Alcohol a few drops of 3½% Eucaine to assist in locating the nerve trunks.—Wilfred Harris, L. i./13,881; ii./22,122.

Danger of injections for neuralgia. Novocaine preferable to general anæsthetic.—L. ii./23,1407.

Pain will not return in the majority of cases if anæsthesia in the centra distribution of the fifth nerve persists for a month. Definitely indicated fo patients who have Radium treatment for cancer of the face, the absolute indication being carcinoma of the maxillæ or of the tongue. The treatment usually gives permanent relief, if enough Alcohol is injected.—B.M.J.E. i./25,22.

Dysphagia of laryngeal tuberculosis has been treated by injections into the sensory nerve of the larynx of 1 Cc. of 80% Alcohol containing 2 grains o β. Eucaine Hydrochloride per ounce.

Inflammation of the Womb and ovaries and general inflammatory conditions of the female genital organs, have been treated by abdominal compresses, first of alcohol 60% strength, and afterwards with 90%, togethe with vaginal tampon 30% strength.

Pneumonia.—The routine use of alcohol, especially in early stage with idea of preventing cardiac failure, is a serious error.—Yeo.

For dietetic use the alcohol from grapes is purest; from corn is next best from beetroot may be impure; and from potato the most dangerous.—W. W. W.

Typhoid (especially of children) has been treated by compresses of Alcohol by means of a layer of absorbent cotton or folded gauze large enough t cover the abdomen entirely, these are covered with a compress of cold wate with impermeable tissue above. The water is renewed hourly—the alcoho is left several hours.

In Skin Affections, especially syphilis, acne rosacea, psoriasis, erythema and angio-neurotic œdema, alcohol has been applied to the part. Locall it is often useful.

Prolapse of Rectum treated by injecting 1·5 Cc. of absolute alcohol o each side or into the peri-rectal tissue at a depth of 2 to 2½ inches.—L. Findla and J. B. Douglas Galbraith, L. i./23,76.

Alcohol as a Food. Moderate doses of alcohol help the digestive proces by increasing the activity of the gastric movements and promoting absorptio (*cf.* our Pepsin experiments, *Vol. II.*). It also increases the rapidity of absorption of potassium iodide. Neither the intake of oxygen nor the output o carbonic acid gas is altered by alcohol, therefore as it has been oxidised i the body it saves tissue and is a food.—Hale White.

Wines may actually render digestion quicker and easier than it otherwis would be. This, indeed, is one of their most useful actions both in health and disease.—Hutchison.

So long as the amount of Alcohol in the body can be oxidised and destroye by the tissues (about 0·185 Cc. per kilo body weight per hour) it acts as food. When this amount is exceeded, it exerts a specific effect on the centra nervous system, inducing toxic effects. An excess, however, of any foo substance in the blood may induce toxic effects, *e.g.*, sugar, in time, ma cause fatty degeneration of the tissues. The value of Alcohol as a food i disease is determined by its very rapid absorption under circumstances when ordinary foods are only absorbed with difficulty.—Dixon, p. 49.

Alcoholic neuritis, formerly common in this country, is now comparatively rare. Alcohol is rapidly absorbed from the stomach and small intestines in from ½ to 2 hours and undergoes no change in the process. It passes direct into the blood stream, and therefore the amount circulating in the blood varies according to quantity taken. Only a small proportion is excreted as such by the kidneys and lungs—about 2% and never more than 10%. The rest is eliminated as water and Carbon Dioxide. 10 Cc. of Alcohol is oxidised in an hour.—T. Grainger Stewart, B.M.J. ii./25,461.

Action of Alcohol on the human economy. Given therapeutically it must be well diluted. In diabetes it ought to be diluted down to 5 or 6% strength and in small doses.—E. Mellanby, B.M.J. ii./22,195.

Alcohol as a Drug of Addiction. Prohibition in other countries has led to other and worse addictions and industrial unrest.—W. E. Dixon, B.M.J. ii./21,822.

The murderers and cut-throats in Ireland, Russia and elsewhere are largely teetotallers. Present day unrest attributed to expensiveness of Alcohol. Would be sorry to see the moderate use of Alcohol abolished in this country. —Sir J. Barr, B.M.J. ii./22,199.

Table showing proportion of accidents in Germany and Austria, as also convictions for assaults, drunkenness, etc., greater on the Monday than other days. Prohibition in U.S.A. is increasing industrial efficiency.—E. L. Collis, B.M.J. ii./22,244.

A recrudescence of Alcoholism in France, due to the substitution of Aniseed liquors for Absinthe, which was prohibited in 1922.—B.M.J. i./26,157.

Venereal disease in relation to Alcohol. A predisposing factor.—L. W. Harrison, L. ii./22,942.

Prof. Starling holds, in moderation, it does not shorten life as compared with total abstinence.—L. ii./23,983.

Alcohol and life duration.—R. Pearl, B.M.J. i./24,948.

Alcohol for Burns.—Cleanse the burns with Alcohol (70%) under Chloroform anæsthesia. The whole surface of the burn and surrounding skin is rubbed vigorously with the dressing. Blisters are rubbed off with all dead tissue (better than using scissors and forceps). After cleansing, a dressing of sterile gauze wrung out of the Alcohol is applied, over this dry gauze and wool: repeat.—L. i./13,705.

Spirit-Glycerin.—For wounds, Spirit and Glycerin alone or with antiseptics, *e.g.* Biniodide Spirit, Glycerin and Ichthyol, act like hypertonic saline in producing free discharge, and require frequent changing. Not so painful as Iodine.—A. Don, B.M.J. i./16,648.

References to Inebriety.

"Drunkenness often chooses for its victims not the men and women originally the worst, but persons of strong social susceptibility and open in special respects to temptation."—Gladstone at Liverpool, 1893.—B.M.J. i./11,515.

Habitual inebriety is an evidence of an unsound mind rather than a cause of it.—C.D. ii./13,1259.

The majority of insane inebriates have become alcoholics because of congenital defects or tendency to insanity, not insane as a result of alcoholism. Alcohol, more of a coefficient than an actual cause of insanity,—this is, however, disputed by others who say that Alcohol is the direct cause in a large proportion of cases.—B.M.J. i./11,1383.

Pharmacology of Alcohol—best looked upon as a drug.—R. B. Wild, L. ii./18,623.

Ammonium Chloride in doses of 30–60 grains with copious draughts of water is a suitable antidote to alcohol. The administration of smaller doses may be continued. It prevents the effects of alcohol, sobers the patient quickly and is a valuable preventive against delirium tremens.

TEST FOR DRUNKENNESS.—The patient is made to inflate a bladder, *e.g.*, a football rubber. The exhaled air obtained is passed through potassium bichromate solution, which changes from yellow to green according to the amount of alcohol. Has been used in U.S.A. The test has been criticised —not infallible.

Excretion of Alcohol in the urine as a guide to Alcoholic intoxication.—H. W. Southgate and G. Carter, B.M.J. i./26,463.

Alcohol and the motorist. Alcohol concentration in the urine as test.—G. Carter, B.M.J., ii./27,333.

For the **Atropine-Strychnine treatment,** *see* **Atropine.**

For the "**Normyl Treatment,**" *see Vol. II.*

ALCOHOLISM, ACUTE, TREATMENT OF, *see* **Poisons and Antidotes.**

Spiritus Vini Gallici.

Brandy. Contains 40 to 50% (or 60% in case of good Cognac) by volume of alcohol. Contains 0·6 to 1·2% Extractive, 0·3 to 0·8% sugar, 0·08% compound ethers and yields 0·01 to 0·02% ash.

Spiritus Vini Vitis, U.S. X. 48 to 54% by vol.

An ounce of brandy yields 100 calories of energy.—Hale White.—*cf.* Nutrimenta.

Brandy Sterules, Hypodermic. Convenient for the emergency bag. Contain 1 drachm.

Spiritus Frumenti. Whisky prepared by distillation of fermented grain—barley, wheat, rye, Indian corn. Sp. Gr. is usually about 0·925, contains 37 to 47% by weight (44 to 45% by volume) of alcohol.

U.S. X. 'From wholly or partly malted cereal grains and not less than four years old, 47—53% by vol.'

For Amounts of Alcohol in various Wines and Spirits see Vol. II.

Eau de Paris. *Syn.* **Spiritus Coloniensis.**

Oil of Bergamot 20, Oil of Lemon 20, Tincture of Musk (1 in 50 Alc. 45%) 5, Oil of Neroli 2, Oil of Cinnamon 1, Oil of Cloves 1, Oil of Rose 1, Alcohol (90%) 1,800, Distilled Water 150 (all by weight). Macerate for 8 days, and filter.

Spiritus Myrciæ, Bay Rum, U.S., 1890.

Oil of *Myrcia acris* (*Myrtaceæ*) 16, Oil of Orange Peel 1, Oil of Pimento 1, Alcohol (94%) 1,220. Mix, and add gradually Water to 2,000. After 8 days filter. Of considerable renown as a **Hair Lotion.**

Another formula is :—Oil of Bay 5, Oil of Pimento 1, Oil of Orange 1, dissolved in Alcohol 400 then add West India Rum 200 and Water 400. History of Bay Rum.—P.J. i./11,655.

Aqua Mellis, Honey Water.

Yellow Sandal Wood, in shavings, 16, Alcohol (90%) 640.

Macerate 7 days, and pour off the alcohol. Add to the marc, Concentrated Rose and Orange Flower Waters, of each 160, shake well, decant, and add to the alcohol set aside. To this mixture add English Oil of Lavender, Oil of Cloves, of each 2, Oil of Bergamot 1, Oil of Nutmeg, Oil of Sandal, of each $\frac{1}{6}$.

Alcohol Allylicum, $CH_2 : CH.CH_2.OH = 58{\cdot}048$.

A colourless liquid miscible with water, with a pungent odour and burning taste. It inhibits bacterial growth. Investigation of Allyl Compounds. *cf.* Sinapis Chapter and Oleum Allii.

Open chain derivatives containing unsaturated carbon atoms are ***more toxic*** than isomeric saturated bodies. Thus Allyl Alcohol is fifty times more toxic than normal propyl Alcohol. In such bodies the combining energy of every atom in the double linking is not completely absorbed. The atoms possess a partial valency—hence the reactivity (Thiele).—O. C. M. Davis, B.M.J. ii./22,12.

Alcohol Amylicum. $C_5H_{11}.OH=88·076.$

Consists principally of primary iso-amylic alcohol. $(CH_3)_2CH—CH_2—CH_2.OH.$

It is prepared by purifying and fractionating fusel oil, collecting that distilling between 257° and 289° F. (125° to 143° C.). Closer range of boiling points has been recommended. If B.pt. 128°—130° C., Sp. Gr. is commercially about 0·833 at 15° C.

Alcohol Methylicum, $CH_3.OH=32·032.$ **Pyroxylic Spirit.**

Dose.—30 to 60 minims (**2 to 4 Cc.**).

Synthetic Manufacture.

Methyl Alcohol is synthesised on a commercial scale from water gas (a mixture of Carbon Monoxide and Hydrogen) under pressure at about 400° C., in presence of a catalyst, usually Metallic Copper containing 10% Zinc Oxide.

$$CO + 2H_2 \Longleftrightarrow CH_3OH.$$

The Badische Anilin and Sodafabrik produced 10—20 tons daily in 1923 at a cost of about 1/- per gallon—one quarter of the market value.—C.D. i./25,884.

Over a million gallons of Wood Spirit are used annually in this country for varnishes. By altering the physical conditions in the process above mentioned, it is possible to produce Ethyl Alcohol and Iso-propyl Alcohol. Synthesis of carbohydrates for food purposes is on the horizon. Iso-propyl Alcohol is hypnotic rather than 'stimulant.' It finds no favour in U.S.A. —B.M.J. ii./26,795.

If absolute and "acetone-free," Methyl Alcohol has Sp. Gr. 0·796, but it is not allowed by the Excise to be retailed pure unless duty-paid. Has been used internally for vomiting of pregnancy, sometimes combined with menthol. The commercial substance known as **Wood Naphtha**, or **Wood Spirit**, is 60 to 90% pure and contains acetone and other empyreumatic impurities. A purer preparation used in the arts has Sp. Gr. 0·81. It is a solvent of pyroxylin. The Methylated Spirit licence is not necessary for the sale of Wood Spirit, but that licence does not, of course, cover the sale of pure Methyl Alcohol.

Wood Alcohol Poisoning is generally accompanied by blindness. The end product excreted by the kidneys is Formic Acid. This reduces Fehling's Solution, so its presence may interfere with diagnosis.—S. L. Ziegler, L. ii./21, 618. It is said that blindness may follow even 7 or 8 Gm. of it but the toxic dose is less. Numerous references to the subject in Edn. XVII., p. 121.

Fumes of Methyl Alcohol killed rats exposed to them in one or two days.—C. D., July 29/22,159.

In 1926 2,000 people died in U.S.A. as a result of drinking so-called whisky prepared from denatured Alcohol.—L. i./27,89.

Methylated Spirit Drinking.—Memorandum dealing with resolutions under consideration by the Convention of Royal Burghs, anent the prevalent evil of Methylated Spirit intoxication. Complicated regulations proposed by the Convention, under police control.—P. J. i./22,387. M.O.H. for Edinburgh stated large quantities were supplied.—C.D., Apl. 2/21,448/449.

For Detection of in Ethyl Alcohol, etc., see Vol. II.

Spiritus Methylatus, Mineralised or Denaturalised.

Since May, 1924, this consists of a mixture of Spirit 90%, Wood Naphtha (Methyl Alcohol) 9.5% and crude *Pyridine* 0·5%, with in addition $\frac{3}{8}$% (0·375%) of mineral Naphtha ('Petroleum') and a small proportion of Methyl Violet to colour. *Caution.*—It is not well adapted for local use—*e.g.* for bed-sores. It forms an opaque mixture with water, and it is *incompatible* with Picric Acid—P.J. ii/24,159. We have confirmed this.

DERMATITIS amongst surgeons of Manchester Royal Infirmary due to use of Methylated Spirit externally, and amongst barbers of that town. Use of Pyridine very common in Continental Spirit, and this was probably the cause of the trouble among hairdressers.—P. B. Mumford, B.M.J. ii./25,607.

The use of Methylated Spirits in the preparation of any article capable of being used internally as a medicine or wholly or partially as a beverage is forbidden. No objection is made by the Board of Customs and Excise to the substitution of Methylated Spirit for Rectified Spirit in making Linimentum Saponis, Compound Camphor Liniment, and Aconite and Belladonna Liniments.

Not more than 4 gallons of methylated spirit may be sold to any one person at one time on one day, and not more than 200 gallons may be kept in stock by licensed retailers, nor may it be sold between the hours of 10 p.m. on Saturday and 8 a.m. on Monday.

Duty free (plain) Spirit can only be obtained by Universities and similar Training Institutes and by Manufacturers of certain chemicals and substances for which Methylated Spirits are proved to be detrimental. The question of increased cost in manipulation has no weight in the eyes of the Board of Customs and Excise.

Industrial Methylated Spirit was introduced by the provision of the Revenue Act, 1906. This is simply a mixture of plain 'Spirits' with one-nineteenth of its bulk (5% of its volume) of Wood Naphtha (Methyl Alcohol) and is obviously considerably purer and of greater utility for manufacturing purposes. The Mineralised Methylated Spirit is retained, but the old name 'ordinary' Methylated Spirit should be dropped as the **Industrial Methylated Spirit** has taken its place. **Industrial Methylated Spirit** can only be used by a Manufacturer on giving a Bond, *i.e.*, if, as would probably be the case, more than 50 gallons per annum is used—less than 50 gallons do not necessitate a Bond.

The Act provided for the use of Industrial Alcohol in the composition of Soaps, Compound Camphor, Aconite and Belladonna Liniments of the B.P.'14. It is less irritating than the old Ordinary Methylated Spirit. The Board allows *these liniments* but not *the indiscriminate use* of the Industrial Spirit.

No person may receive it without the authority of the Board. It *may in no circumstances be used* for any purpose *except those for which the Commissioners* have specifically authorised *the user to employ it.*

The regulations governing the use of Industrial Spirit are prescribed by the Commissioners of Inland Revenue under Authority of the Spirits Acts, 1880.—B.M.J. i./14,1200.

'Surgical' Spirit.—In consequence of the addition of Pyridine to the formula for Mineralised Methylated Spirit, to render it wholly undrinkable, the Spirit in question was unsuited for local use and also unpleasant to burn. The Board of Excise therefore permitted the use of Industrial Methylated Spirit (*i.e.*, unpyridinised) under certain conditions, if suitably denatured, employing an approved formula.

The following has been used: Castor Oil ½ ounce, Boric Acid $1\frac{3}{5}$ drachms, Industrial Methylated Spirit to 1 pint.

No prescription is necessary, and if supplies are obtained from a wholesale house it is unnecessary for the retailer to keep records of the sale of Surgical Spirit. *Any* desired quantity may be sold.

Surgical Spirit may not be used as a base in the manufacture of other preparations. It must be sold exactly as received from a wholesaler.—P.J., i./26,323,536.

Further ref., B.M.J., i./25,316,

Industrial Methylated Spirits *for use in Dispensing Prescriptions.*

By the Methylated Spirits Regulations, 1925, No. 10, S.R. & O., 1925, No. 1240, commonly known as *'Regulation 10'*—

(1) A Pharmaceutical Chemist, or Chemist and Druggist, when authorised by the Commissioners, may sell Industrial Methylated Spirits, *as received or as a constituent of a preparation for external use only* for medical, surgical and veterinary purposes, as follows:—

(*a*) On a written *order* or prescription dated and signed (i) by a qualified practitioner or dentist, for use as a skin application, or for sterilising instruments; or (ii) by a veterinary surgeon for animals, or for sterilising instruments. ***Not more than one imperial pint*** of spirits, either alone or as an ingredient, may be supplied at one time to or for the use of ***any one person.*** *This refers to both* (*i*) *and* (*ii*).

(*b*) An order must state the intended use of the spirits.

(*c*) The quantity of spirits required, and shall not be acted upon more than seven days after date.

(*d*) An order must bear the name and address of the person to whom the spirits or preparations are to be supplied by vendor.

(*e*) The order or prescription must ***be copied in the Prescription Book*** with patient's or animal owner's full name and address, together with the full name and address of the practitioner (etc.), a similar entry being made on every subsequent occasion. A fresh order is necessary every time that spirits alone are required, but not for 'preparations.'

(*f*) The container in which the spirits are supplied without admixture must be labelled ***"Methylated Spirits," "For external use only, for medical, surgical or veterinary purposes,"*** with name and address of vendor.

(2) With every delivery of spirits as such, or as a constituent of a preparation, the vendor must enter the prescription in his Prescription or other special Book and record particulars, giving date of receipt of the spirits, name and address of Methylator, bulk received, date of sale, number of order or prescription, quantity supplied, such book and record being kept on his premises and being open to inspection by an Officer. If the preparation is not in the B.P., B.P.C., or other well-known book of reference, the formula should be recorded in the Prescription Book.

(3) This Regulation shall not apply to preparations made with Industrial Methylated Spirits for use in an art or manufacture under the special authority of the Commissioners.

These Regulations came into force on the 1st February, 1926. ***It is otherwise illegal to dispense the Industrial Spirit even on a doctor's prescription.***

The Retail Pharmacists' Union, 4 & 5, Queen Square, London, W.C., issues a book for keeping the records in manufacture and in dispensing.

References: P.J., i./26,37 (complete Regulations), 64.

The Ministry of Health, in **Insurance Dispensing**, require Industrial Spirits to be used, even when Methylated Spirit is ordered.—W. Forster, C.D., Oct. 2, '26,547.

Industrial Methylated Spirit can be obtained by a retail chemist under Regulation 10 from any ***'authorised' wholesale druggist*** in quantities not exceeding one gallon at a time. It may not be used for any internal purpose whatsoever, nor without the consent of the Board in making any proprietary preparation. No volatile oil or perfume may be added to the spirits.—P.J., ii./26,12,14,22.

Industrial Spirit for Manufacturing Purposes can only be obtained from an authorised Methylator in quantities not less than 5 gallons.

An authorised chemist who obtains supplies from a licensed Methylator may, if licensed as a retailer of Methylated Spirits, supply Industrial Methylated Spirits to ***another chemist*** on the latter's written order, in quantities not exceeding a gallon at a time. Record to be kept and the order kept for inspection.—P.J., ii./26,12,14.

French Polish or Finish (Spirit Varnish). Three ounces of Shellac is the minimum amount of gum resin or resin allowed per gallon.

Prior to these new Regulations a concession was made by the Commissioners of Excise in 1913 respecting the use of Mineralised Methylated Spirits to the effect that 'Mineralised Methylated Spirit may be used by registered chemists and druggists in the preparation of lotions for external use, when prescribed by duly qualified medical practitioners,' but chemists are liable to the penalty imposed by law if the Methylated Spirit is used in any preparation capable of being consumed as a beverage, or used internally as a medicine.

This concession still holds good at the time of going to press, but the Commissioners point out they cannot accept any responsibility in regard to the use of Mineralised Methylated Spirits in the preparation of any article, the formula of which has not been approved by them.

It is, in short, 'up to' the chemist to ensure that a prescribed preparation cannot be 'consumed.'

"**Power-Methylated Spirits**" was introduced in the Finance Bill, 1920.

Duty Free Alcohol, other than Mineralised and Industrial Methylated Spirit, is obtainable by permission of the Commissioners for use in any art or manufacture in which the spirit is required and where it is proved to their satisfaction that Methylated Spirit is unsuitable or detrimental. A bond must be given and the *attendance of a Revenue officer* to witness the denaturing of such supplies is requisite.—Board of Customs and Excise, per P.J. i./15,34. *See also* P.J. ii./14,316,339.

Alcohol 75% (about 5 volumes of 90%, or of Methylated Spirit, to 1 of Water) is used for sterilising the skin and instruments.

Denaturalised spirit in Germany contains 2½% of a mixture of wood spirit 80 parts, pyridine bases 20 parts. (This amounts to 0·5% 'Pyridine' as in our new (1924) Methylated Spirit.)

U.S. gives a method of detecting Methyl Alcohol.

Lotio Evaporans, St. M.'s H. Methylated Spirit 1 drachm, Solution of Ammonium Acetate 1 drachm, Water to 1 ounce.

Antidotes.—In America, poisoning by so-called deodorised spirit is common. In acute poisoning treat by rectal injections and stomach pump. Give brandy, strychnine or coffee.

Further, for the subsequent amaurosis give pilocarpine and potassium iodide, and later strychnine hypodermically or *per os.*

Treatment: Pilocarpine sweats with Potassium Iodide or Sodium Salicylate in the early stages and full doses of Strychnine hypodermically when optic atrophy sets in.—B.M.J. ii./06,1855.

ALCOHOL ISOPROPYLICUM.

Syn. SECONDARY PROPYL ALCOHOL, DIMETHYL CARBINOL, AVANTINE, $CH_3.CH(OH).CH_3=60{\cdot}064$.

Iso-propyl Alcohol Regulations, 1927.

Manufacturers, sellers and users of Iso-propyl Alcohol in Great Britain and Northern Ireland must render a six-monthly return to the Customs and Excise authorities, showing the quantity manufactured, *used, and/or sold, together with the names of purchasers, and the purposes for which the Alcohol has been used.*

A colourless liquid with spirituous odour and somewhat burning taste. In the anhydrous condition it has Sp. Gr. 0·789 at 15·6° C. and B.pt. 82·4° C. Commercially, it is available admixed with water. A mixture containing 95% to 96% of the Alcohol has Sp. Gr. 0·810. [Our examination of the 95% article (British made) of commerce showed Sp. Gr. 0·8135. It distilled chiefly at 81° C.]. It is miscible with water or Ethyl Alcohol in all proportions.

Preparation.—It may be made on synthetic lines, *e.g.*, by reducing Acetone, using Sodium Amalgam or by passing Acetone and Hydrogen over a metallic catalyst, or by treating Propylene, in the Petroleum Industry. The latter is less pure and considerably more pungent, *vide Vol. II.*

The following notes have appeared regarding its manufacture:

Production as a by-product of the Petroleum Industry in the U.S.A. The method is to absorb the olefine gases, containing Propylene, in Sulphuric Acid and hydrolise the resulting Alkyl-sulphuric Acids:

$$CH_3.CH : CH_2 + H_2SO_4 = CH_3.CH(OSO_3H).CH_3$$

Propylene Isopropyl Sulphuric Acid.

$$CH_3.CH(OSO\ H).CH_3 + H_2O = CH_3.CH(OH).CH_3 + H_2SO_4.$$

The rectified product contains 91% of the Alcohol and Sp. Gr. 0·819. It cannot be concentrated by simple distillation beyond a certain point, but with dry Caustic Soda it can be made anhydrous.—H. D. Grant and C. O. Johns, Am. Jl. Ph., June, 1922, P.J. ii./22,272;

Chemical Examination.—Iso-propyl Alcohol, unless supplied as a commercial one, should be free from Acetone, Petrol hydrocarbons, leave no residue on evaporation and contain no added perfume. The Petrol product of commerce certainly has a Petrol odour and taste.

To test for Acetone employ Rothera's Test, *vide* Vol. II.

Pharmacology.—Isopropyl Alcohol is twice as toxic as Ethyl Alcohol intravenously in cats. Vapour of Isopropyl Alcohol did not kill rats exposed to fumes (*cf.* Methyl Alcohol). 50 Cc. given *per os* to a dog weighing 6·5 kilo. caused serious incoordination, but the animal completely recovered. Applied to wounds in concentration up to 50% allowed same to heal normally.—P.J. ii./22,272.

It is stated to be less toxic than *n.*-Propyl Alcohol. Administration by mouth produces narcosis, in larger doses anæsthesia, finally coma and death. Very little is absorbed by inhalation or through the skin.—J.C.S.A., 1922,1093.

Uses.—It is safe internally in small doses in dilute form, and should be useful to make tinctures of drugs. It has been suggested as a surgical antiseptic and could, no doubt, replace Ethyl Alcohol in many surgical and medical procedures. In commerce, it is also suited as a solvent for crystallising and extract manufacture. (Note:—Its boiling point is only 2° to 3° higher than Ethyl Alcohol), and it has the advantage in perfumery and in the culinary arts (flavouring essences) in avoiding excise requirements.

Externally, it has been found harmless to the skin and hair, and within reason it can be inhaled mixed with air.

Acne of face, complicated with severe seborrhœa, treated by

35% solution two or three times a day. Non-irritating—also good in prurigo, pityriasis and seborrhœa of the head.—B.M.J.E. ii./21,85.

The above remarks apply, it should be noted, to isopropyl Alcohol. The isomeric NORMAL PROPYL ALCOHOL *(Syn. Primary)* $CH_3.CH_2.CH_2.OH$ *obtained from fusel oil is more toxic and unsuited for making tinctures and the like.*

'Isopropyl' Tinctures and Spirits.—We made and examined (1923–24) samples of the following, keeping the content of active ingredients the same as those in the *B.P.* '14 Tinctures, and assaying where necessary. In each case the brand known as 'Avantine' was used.

The object was to determine whether Isopropyl Alcohol has a power equal to Ethyl Alcohol to extract the drugs. The percentages of extractive 'Residue' obtained in our laboratories are arranged beside similar data recently obtained in respect of *B.P.* '14 Tinctures.

To those conversant with this type of work, these figures are evidence of the suitability of Isopropyl Alcohol—the slight differences in figures as compared with the *B.P.* '14 Tincture figures are justifiable. It is of interest to remark that few figures for 'Extractives' have been published in respect of the 1914 B.P. Tinctures, while in past years, as applying to the '98 and '85 Tinctures, the subject was much discussed by Pharmaceutical chemical houses, and in passing we may add that *B.P.* '14 Tinctures made with authentic samples of drugs yield very considerable differences in extractive content.

ISOPROPYL TINCTURES.

TINCTURA.	STRENGTH USED %.	% EXTRACTIVE RESIDUE.	% EXTRACTIVE RESIDUE FROM *B.P.* '14 TINCTURES
Asafetidæ	70	8·5	9·3
Aurantii	90	3·6	2·7
Benzoini Composita.	90	18·2	17·1
Calumbæ	60	1·0	1·5
Camphoræ Comp.	60	Satisfactory solution.	
Cantharidini.	90	Satisfactory solution.	
Capsici	60	1·6	0·6
Cinchonæ Comp.	70	3·9	4·4
Colchici	70	2·7	2·3
Ergotæ Ammoniata	60	4·4	4·0
Guaiaci Ammon.	90	15·1	17·0
Hyoscyami	70	2·4	2·5
Iodi Fortis.	90	Satisfactory solution.	
,, Mitis.	90	Satisfactory solution.	
Limonis	90	2·1	2·3
Nucis Vomicæ.	90	Satisfactory solution.	
Pruni Virg.	90	15·0	13·0
Quininæ Ammon.	60	Satisfactory solution.	
Tolutana.	90	8·1	9·0
Valerianæ Ammon.	60	2·8	3·4
Belladonnæ	70	The alkaloidal content of the stron tinctures made by *B.P.* '14 directions, bu using isopropyl Alcohol is amply sufficien to allow of dilution to *B.P.* '14 strength	
Cinchonæ	70		
Opii	90		

All these tinctures resemble the *B.P.* '14 preparations with the exception of a slight distinctive taste; this is not noticeable when the preparations are diluted. The characteristic smell of the freshly prepared tinctures due to the isopropyl alcohol, entirely disappears after about 4 to 6 weeks.

ISOPROPYL SPIRITS.

SPIRITUS.	STRENGTH.	
Ætheris.	1 in 3	Sp. Gr. within *B.P.* '14 limits.
Anisi	1 ,, 10	See Notes below.
Cajuputi.	1 ,, 10	
Camphoræ.	1 ,, 10	
Chloroformi.	1 ,, 20	
Cinnamomi	1 ,, 10	
Juniperi.	1 ,, 10	
Lavandulæ.	1 ,, 10	
Menthæ Piperitæ.	1 ,, 10	
Myristicæ.	1 ,, 10	
Rosmarini.	1 ,, 10	

All the above dissolved easily and gave good, clear solutions except Spiritus Juniperi. All appear to be miscible with Isopropyl alcohol in all proportions except Spiritus Juniperi and Spiritus Myristicæ.

The general conclusion to be drawn from this investigation is that *isopropyl* Alcohol is a suitable menstruum and solvent and can be used to replace Ethyl Alcohol for drug extraction and for dissolving volatile oils.
The procedures are at present illegal for *B.P.* '14 preparations.

ALDEHYDA.

Aldehydum Absolutum. *Syn.* **Acetaldehyde** $CH_3.COH=44\cdot032$.

A colourless mobile liquid, irritating when inhaled. Sp. Gr. 0·7876 at 16° C. B.Pt. 21° C. Becomes acid on keeping exposed to air—oxidation to acetic acid. Polymerises with rapidity in presence of sulphuric acid at atmospheric temperature into paraldehyde (*vide infra*), but if temperature be below 0° C. crystalline **metaldehyde** is formed.

Aldehydum Dilutum.

Contains 15% in Alcohol, is neutral to test paper, and has an ethereal suffocating odour, producing spasm of the glottis when respired. Diluted 1 in 1000 with water at 140° F. has been used as inhalation in catarrh and ozœna.

Paraldehydum $(CH_3.COH)_3=132\cdot096$. (*B.P.* '14.) U.S.

Dose.—30 to 120 minims (2 to 8 Cc.), or more, in diluted syrup or almond mixture, repeated if needed in ½ an hour. (In the knowledge of the writers ½ ounce has been given—this is probably a maximum single dose.)

A colourless liquid, crystallizing below 50° F.; Sp. Gr. 0·998; may be obtained by treating Aldehyde with dilute sulphuric acid. *Soluble* 1 in 10 of water and in all proportions in alcohol 90%.

Uses.—As a sedative and hypnotic, but without action on the heart. In spasmodic asthma it relieves spasm and induces sleep. Intravenously it is an anæsthetic and hypnotic. *v. infra.*

It is diuretic. It sometimes produces rash and digestive disturbances, and slight excitement.

A case is recorded of three and a half ounces taken in error; 9 hours afterwards strychnine hypodermically and ammonia applied and injected: recovered consciousness in 34 hours. Two ounces have proved fatal.—W. W. W.

In delirium tremens 100 minims is a safe hypnotic.—Whitla.

Flavoring.—Prescribed as Elixir or Mistura Paraldehydi, *q.v.* Extractum Glycyrrhizæ Liquidum covers the taste.

Elixir Paraldehydi.

Dose.—1 to 3 drachms (4 to 12 Cc.).

Paraldehyde 240, Glycerin 240, Alcohol (90%) 480, Oil of Cinnamon 4, Oil of Bitter Orange 8, Saccharin 1.

Strictly speaking, however, alcohol is physiologically incompatible with paraldehyde.

Mistura Paraldehydi.

Paraldehyde 2 drachms, Essential Oil of Almonds (*sine* Acid. Hydrocyanic) 3 minims, Syrup 1 ounce, Liquid Extract of Liquorice 2 drachms, Water to 4 ounces. This covers the nauseous taste to some extent and forms four doses of ½-drachm or two doses of 1 drachm. The following are preferable :—

Paraldehyde Capsules. 10, 20 and 30 minims.

Dose.—1 or more.

Mistura Paraldehydi et Potassii Iodidi.

Dose.—1 drachm (4 Cc.).

Paraldehyde 1·25, Potassium Iodide 0·92, Liquid Extract of Liquorice 6·25, Water to 100.

In broncho-pneumonia and capillary bronchitis of infants valuable. The constituents of the mixture are incompatible, free Iodine being formed but not sufficient to harm. In severe cases the secretions dry up remarkably.

Intravenously as Anæsthetic.—Deep anæsthesia can be produced. 5 to 15 Cc. mixed with equal quantity of Ether and this mixture dissolved in 150 Cc. of cold solution of Sodium Chloride (1%) in sterile water. Inject the solution cold or at not exceeding 25° C. Minor operations may be performed when 10 Cc. of the chemical have been given, but as it is rapidly excreted by the lungs usually the whole 15 Cc. will be required.—H. L. C. Noel and H. S. Souttar, L. ii./12,818,1221; Oliver Atkey, L. i./13,168.

Paraldehyde 1 drachm, Ether 3 drachms, and Liquid Paraffin 4 drachms, given *per os* produced sufficient analgesia to permit of dressing of painfu wounds.—J. T. Gwathmey and H. T. Karsner, Jl.A.M.A., April 6th, 1918; L. i./18,711.

Metaldehyde.—Usually thought to be a combination of 3 molecules of Acetic Aldehyde, as in the case of Paraldehyde. Made by treating Acetic Aldehyde with a small amount of Sulphuric Acid at a low temperature (below 0° C.).

'*Meta*' is a trade name for compressed Metaldehyde. It is a solid fuel burning with a non-luminous carbon-free flame, used in place of Alcohol, etc. It emits characteristic odour on burning owing to presence of traces of unpolymerised Acetaldehyde.—P.J. ii./26,292.

Aldehydum Formicum. H.COH.=30·016.

Formic Aldehyde in vapour is an active antiseptic, preventing decomposition and fermentation, while it is comparatively non-poisonous.

Liquor Formaldehydi (*B.P.* '14), U.S., P. BELG., FR. CX., P. JAP.
Syn. FORMALIN, FORMOL, METHANAL, METHYL ALDEHYDE SOLUTION.

PATENT : A patent was granted 7038/1893 for the 40% solution describe as a New Antiseptic material. *Expired* 1900.

TRADE MARK : An application to register the word "formalin" was refuse in 1900 on the ground that it was the name of the patented article.—C.D.

Dose.—1 minim, *internally*, well diluted. *Hypodermically, vid* References, *infra.*

Wiley gave 0·1 to 0·2 Gm. daily in an investigation.—*Cf.* Vol. II., *Milk Preservatives.*

An aqueous solution of Formic Aldehyde, containing 36 to 38% *w/v.* Sp. Gr. 1·079 to 1·081. (35% by weight=38% by volume.) Assay method by means of sodium hydroxide and hydrogen peroxide is given (*B.P.* '14). P. JAP. has also **Aqua Formalinata** 1 in 35 of the 35% preparation.

Manufacture by oxidation of methyl alcohol by air in conjunction with the catalytic action of Copper Gauze or a Copper couple coated with a film of Silver or Platinum. It is the custom (C.D. Commercial Compendium), to prevent polymerisation, to leave some Methyl Alcohol in the commercial article, which may correspond to Formaldehyde 36, Methyl Alcohol 12, Water 52.

NOTE :—*Confusion arises with regard to prescriptions for this solution. It is to be understood that a 1% Solution of Formalin means 1% of the Commercial '40%' Formaldehyde Solution. 1% Solution of Formaldehyde means 1% of actual Formaldehyde H.COH.*

Antidotes.—Stomach tube and emetics followed by alkaline drinks, sal volatile (or ammonia in other suitable form), alcohol.

Uses.—For *wound treatment*, and for sterilising surgical instruments, and the hands of operators, *e.g.*, as FORMOSYL, *q.v.* Has been suggested, 1 or 2%, as a pigment and spray for *diphtheria.* Also as Glycerin Pigment 2% to the throat in *angina follicularis*, and as a lotion in *pertussis* 2% or less—with caution. See also Paraform. As compresses to *malignant tumours* 2% or stronger either as palliative, or prior to removal. For *alopecia* 10% or stronger. For *eye washes* $\frac{1}{20}$% has been employed.

It shrivels up soft corns, causing them to drop off if applied daily. Under the name of **Durine** a preparation is made for this purpose.

For a common cold inhalation of 1% will cure.

Ophthalmia, trachoma (1 in 2,000 up to 1% used) and *sweating feet* are well treated by a lotion. *Ringworm, lupus, laryngeal growths* by pigment of 1 to 3 glycerin. A spray or douche is useful for *ozœna* (1 in 2,000 up to 1 in 500 with coarse spray). For puerperal fever uterine injection of 1 ounce of glycerin with 3% of Formalin. Also 1 minim doses *per os* have been practised.

Recurrent pleural effusion has been treated by intrapleural injection of Glycerin 1 ounce, containing 10 drops of Formalin.

Eczema in *dry* form should be treated with moist formalin application, *e.g.*, 1 of formalin (40%) in a starch and water jelly 99.

To eczema that is weeping, apply Lysoform or other formalin dusting powder. Staphylococci of eczema are killed by 1% 'Formalin.'—E. Blake.

Vegetable Infusions.—From 0·05 to 0·1% Formaldehyde is generally adequate to preserve.

For preserving and embalming animal tissues and museum specimens dilute about 10 times—to harden about 25 times, but for preservative purposes a far weaker solution is sufficient.

For Room Disinfection and Utensils (in addition to sunlight, resh air and soap and water) 1 or 2% Formalin as spray (coloured fabrics are not injured), or burn **Formalin Disinfecting Tablets**, *q.v.*

As a wash, up to 10% solution may be used. For furniture 1% would be suitable. Or simply *evaporate a pint of Formalin pe 1,000 cub. ft. in an open vessel over a bunsen or spirit lamp.*

Fumigators are made for room disinfection. They are arranged to be lit at the bottom of the container whilst the fumigator stands on a tray with a little water. Formaldehyde is volatilised into the room and continues to be evolved for ½ hour. Windows, etc., to be pasted down in the usual way where complete disinfection is required, and clothing, etc., left exposed to the vapour for 3 or 4 hours.

For the use of **Formalin with Potassium Permanganate** *for Room Disinfection and for purifying utensils, also as Preservative of Foods, also fo the Detection in Milk, Urine, etc., and for Method of Determination and it General Antiseptic Power, see Vol. II.*

REFERENCES TO USE OF FORMALIN

Acute ENDOMETRITIS has been treated by injecting 50% solution of Formalin into the uterus and washing out again quickly. Not so dangerous as Zinc Chloride.

EPITHELIOMA on the face has been treated with Formalin after using Cocaine. The treatment is repeated after four days—the scab comes off and the surface below cicatrises rapidly. There is no local reaction, but the method is only suitable for epithelioma not larger than a florin. A solution of 2% Formaldehyde is valuable in extensive and inoperable cases. It causes necrosis and elimination of neoplastic bodies without irritating healthy adjacent tissue or causing pain.

APHTHOUS ULCERATIONS of the buccal mucous membrane may be washed with a tampon soaked in Formalin. *Use Cocaine first.*

RINGWORM can be cured by painting with it, keeping the patch of skin in such a position that the solution will not run off it. One painting usually suffices. If skin greasy wash with Spirit first. May smart a little but otherwise rapid, clean and effective. Second application may be repeated in five days' time.

TUBERCULOUS EMPYEMA treated by injecting Formaldehyde-Glycerin (2% Formaldehyde in glycerin). After removal of purulent material 1 to 12 ounces of this solution employed.—L. ii./21,770.

BACILLARY DYSENTERY treated by rectal injections of Formalin, 300 Cc. of 1% twice daily. Painful.—Schiff, Abst. Pres., Oct. 20,355.

SENSITISATION WITH FORMALIN in a medical student. Desensitisation by injections of 1 Cc. of 1 of Formalin in 1,000,000, then 2 Cc., and later 4 Cc. Rash disappeared.—H. MacCormac, B.M.J. ii./25,731.

Formaldehyde Poisoning by drinking 3 ounces of 4% Formaldehyde. Unconsciousness occurred in three minutes. Treatment consisted in washing out the stomach with strong Saline Solution and later with a Solution of Ammonium Acetate. At the post mortem examination it was found that the interior of the œsophagus and stomach was extremely corroded.—B.M.J. ii./12,350, 1470.

Poisoning of a boy, aged 7, treated by washing out the stomach and then giving a quantity of very dilute Ammonia, as an attempt to produce Hexamine with the Formaldehyde. An uneventful recovery was made.—B.M.J., ii./27,687.

PREPARATIONS OF FORMALDEHYDE

Collutorium Formalini, R.D.H.

Formaldehyde Solution 18 minims, Peppermint Oil 5 minims, Alcohol (90%) 1½ drachms, Peppermint Water to 1 ounce. Half a teaspoonful to a tumbler of water for use.

Gargarisma Formaldehydi.

Formalin Solution 1 minim to Water 1 ounce.

Nebula Formaldehydi.—C. Muthu's Inhalants.

Inhalant 'A.'—Chloroform 1 drachm, Menthol 10 grains, Pumilio Pine Oil 10 minims, Alcohol (90%) to 1 ounce, with 2½%

Formaldehyde (in the form of gas). '**B.**'—Guaiacol 1 drachm, Chloroform 1 drachm, Menthol 15 grains, Pumilio Pine Oil 15 minims, Alcohol (90%) to 1 ounce with 5% Formaldehyde. '**C.**'—Guaiacol 2 drachms, Chloroform 2 drachms, Menthol 15 grains, Pumilio Pine Oil 15 minims, Terebene 1 drachm, Alcohol (90%) to 1 ounce. '**D.**'—Guaiacol 2 drachms, Iodine 1 drachm, Terebene 1 drachm, Pumilio Pine Oil 15 minims, Chloroform 2 drachms, Alcohol to 1 ounce.

Dose.—About 10 drops of one of the above sprinkled on the inhaler every half to one hour, and used by continuous inhalation.

These inhalations are used progressively. After reaching 'C,' 'D' is used as an alternate Solution or for night use.

About 50% of phthisical patients treated are stated to have recovered under the treatment.

Strengths of Formalin admissible for Inhalation.

We instituted some experiments and found as follows:—

A plain 1% mixture of Commercial Formalin in 90% Alcohol (*i.e.*, without Chloroform, etc.) could be tolerated without it being too irritating to the throat and nostrils.

A 5% mixture was too irritating for prolonged use by inhalation.

A 10% mixture was out of the question.

All the above were tried in an ordinary Burney Yeo Inhaler.

Formalin and Chloroform Solutions :—

No. 1. Formalin 5, Chloroform 15, Alcohol (90%) 80.

No. 2. Formalin 10, Chloroform 20, Alcohol (90%) 70.

No. 2 is only ventured upon where Formalin is well and easily endured. In the absence of the anæsthetic effect of the Chloroform patients were not able to bear even the mild preparation for any length of time. Results in phthisis encouraging.—H. Collier.

Formanilid. $C_6H_5NH.COH = 121{\cdot}064$. *Dose.*—2 to 4 grains (**0·12 to 0·25 Gm.**). Hypodermically 15 minims (**1 Cc.**) of 3% solution. Yellowish crystals soluble in water and alcohol, melting at 46° C. Employed in hæmorrhage and fevers. 20% solution said to produce local anæsthesia in 1 hour. 2 to 3% for urethral discharge.—M Am., 1907 To be distinguished from Formamid, $HCO.NH_2$.

✱ Formosyl (T.M. 293326).—This preparation is a liquid formaldehyde potash soap. It is highly antiseptic, relatively non-poisonous, inodorous, deodorant and cheap; does not coagulate albumin, and is miscible with water and alcohol in all proportions. It combines the penetrating lathering action of soap with the antiseptic power of Formalin. A 5% solution is rapidly fatal to *B. typhi abdominalis*, *B. coli communis*, and the *Staphylococcus pyogenes aureus*, and a 3% solution destroys *B. anthracis* spores in 24 hours. A 2% solution is sufficient for general purposes and is better freshly prepared. For hand disinfection 1 to 2% is suitable. The stock bottles should be kept well corked.

Uses.—In using warm solutions a temperature of 45° C. should not be exceeded; ½ to 1% is suitable for irrigation of the vagina, uterus, abscess cavities, &c. Diluted it is useful for psoriasis, lupus, eczema, and as a wash for perspiring feet. Impetigo may be treated with 5% **ointment** combined with carbolic acid and ammoniated mercury, or same strength with zinc ointment (paraffin basis) for eczema. 25 to 50% ointments with lanolin basis are applied t ringworm and alopecia areata. A 10% **ointment** is used in psoriasi 20 to 30% may be used to arrest sweating of the feet where of limite area. For seborrhœa a 10% ointment with 5% resorcin is usefu 10 to 15% in gall ointment is suitable for piles.

In the sick room and operating theatre its deodorant propertie will be evident. It cleanses suppurating wounds and has stypt action on bleeding surfaces. Two to 5% is also suitable for bite stings and burns. It is valuable also for general household disin fection, for deodorisation and cleaning. Good results have bee obtained with it in veterinary use.

Formosyl Mouth Wash. An efficient antiseptic. A small tea spoonful is added to a tumbler of water and used in the customar manner. Agreeably flavoured.

Dermatologists who treat the skin with lotions and ointment and leave the state of the mouth unattended to, are proceedin on the most unscientific lines. Eruptions on the head and fac are frequently found in conjunction with an unhealthy conditio of the teeth and gums.

Thymaglycin is a further alkaline mouth wash to which referenc may here be made.

Formosyl Gargle.

This preparation contains Formalin, Phenol, Boric Acid, Essentia Oils, etc. An antiseptic preparation suitable for use as a *garg* or mouth wash.—1 tablespoonful with an equal quantity of wate (preferably warm).

As Nasal Douche.—Dilute four to eight times.

The commonest avenue of rheumatic infection is the tonsil and next t it the nose. Irrigation and thorough cleansing of the nose and pharyn with an antiseptic lotion is essential routine in anti-rheumatic treatmen The paper entitled 'The Avenues of Rheumatic Infection' is the outcom of examination of 75 cases of Sydenham's chorea. Of these 88% showe nasal and pharyngeal inflammations.—W. P. S. Branson, B.M.J. ii./12,143

Formosyl Tooth Paste, Tooth Soap, Tooth Powder, Dustin Powder (for moist surfaces, bed sores and syphilitic ulcers) ar prepared, also **Pessaries** of Cacao Butter, containing 2 grain each.

$\boxed{\mathfrak{D}}$ $\boxed{\mathfrak{P}1}$ **Formosyl Dental Dressing** in paste form is prepare containing 6% Cocaine.

Formosyl Pastils are useful to allay irritation and are antiseptic.

Liquor Formaldehydi Saponatus (*B.P.* '14), contains 20% Formaldehyde Solution.

Formalinsåpa, Terpinoform P.Svec. X.

Terpineol 5, Alcohol 90% 20, Soft Soap 40, Formaldehyde Solutio 35. A pleasant, fragrant antiseptic preparation.

✱**Cromessol** (T.M. 397289). An antiseptic containing Formalin an essential oils. Has germicidal powers equalling Carbolic Acid. Lice do n live more than 6 hours after being sprayed with it.—L. ii./26,1118.

Aniodol.—A solution of Formaldehyde in Glycerin, containing som Allyl Sulphocyanide. As a disinfectant for instruments, etc., 1 in 500 dilutio As antiseptic to wounds, 1 in 4,000. As a gargle, 1 in 2,000.

Yadil (T.M. 371511 Class 3, and 37152 Class 48).

Syn. **'Tri-Methanal-Allyl Carbide.'**

A water-white liquid having a slight allyl odour and a sweetish and pungent aste like Formalin. Sp. gr. 1·015. Neutral or very faintly acid.

Uses.—An antiseptic solution employed as a deodoriser and bactericide ocally For external use employ 1 in 300 as nasal spray, gargle or wash for ffensive perspiration. Has been used for impetigo, acne, erysipelas, eczema nd chilblains. For enemas and vaginal douches 1 in 150. For instruments in 80.

Sir W. J. Pope found about 1% Formaldehyde, 4% Glycerin, with a minute uantity of either garlic or mustard oil. Prof. Dixon made indictments egarding its advertisement for cure of phthisis.—*Daily Mail*, July 22 and 23, 924. It is very weak relatively to Carbolic Acid.—J. Eyre, *ibid.* July 26, 24.

Paraform (T.M. 216093) **Paraformic Aldehyde, Tri-oxy-methylene,** Fr. Cx. **Formaldehydum Polymerisatum, P. Belg.** U.S. X., $(H.COH)_3$.

Manufacture.—On evaporating aqueous Formaldehyde olution, the polymer Paraform $(H.COH)n$ throws out, which, on rying, changes to $(H.COH)_3$—Trioxymethylene. Yield practically heoretical.

White amorphous masses, slightly soluble in water, with an rritating vapour especially on heating, when Formaldehyde is ormed.

Room Disinfection: Tablets of Paraform 1 gramme, **ormalin-Disinfecting Tablets,** are used in a vaporiser or with night light,—20 to 25 tablets per 1,000 cubic feet, the latter number nsuring thorough disinfection. Walls and furniture should first e sprayed with water.

They are also prepared of strength 0·1, 0·25 and 0·5 Gm.

The use of 20 Gm. of Paraform or an equivalent of Formalin Solution, *e.*, 1¾ ounces of the 40% article, killed *B. typhosus* by two hours exposure. ixed vapours of Sulphur Dioxide and Formaldehyde may have advantages o destroy, in addition to bacteria, vermin such as moths, fleas and bugs. he efficacy of Sulphur Dioxide, particularly when in association with aqueous apour, was also clearly re-established.—C. T. Kingzett, H. F. Bottomley nd J. E. Brimley, M.P.C. i./17,157.

Advice upon disinfectants and sick-room disinfection. Spring-cleaning lone is not adequate. The 'poisonous' 3% Phenol preparations sold y grocers, etc., are criticised, *cf.* our p. 30.—H. R. Kenwood, L. i./26,1055.

The value of terminal disinfection of premises after infectious disease is eing regarded with increasing scepticism. It was dropped in Rio de aneiro in 1920 without untoward results.—L. ii./26,610.

Catheters may be maintained aseptic by wrapping in lint impregnated with 20% of paraform.

Dental Use.—Paraform, for the induction of painless dentine rilling is mixed with Harvard Cement in the proportion of 1 to 20 nd then made into a fairly firm mass with the fluid. If left in the avity from 1—3 months the cavity may be shaped without any ain to the patient. In addition, the slow emanation of formaldeyde gas over a lengthy period most probably arrests the process f decay. The cement should not be placed closer than half way o the nearest point of the pulp.—E. Clayton, Trans. Brit. Soc. ental Surgeons, 1925, No. 1, p. 33.

Paraform Collodion, 25% strength, applied three times a day to warts is efficacious.

Whooping-cough has been treated by inhalation of Formali vapour—*i.e.*, from Paraform.

Insufflatio Paraformi. *Syn.* PARAFORM SNUFF.—Paraform 40 Ammonium Chloride 20, Lavender Oil 0·2, Menthol 0·5, Lycopodium to 100. This preparation should prove a useful nasal antiseptic. We found that Paraform as such, undiluted, can be tolerated by the nostrils without causing irritation or sneezing. If sneezing is undesirable the Ammonium Chloride must be omitted, also th Paraform may be reduced if preferred.

Mixtures of Paraform with Sodium, Barium or Strontium Peroxide, whe brought into contact with water, yield formaldehyde vapour—subject of patent.—P.J. i./07,472.

Pasta Formalini, R.D.H. Thymol 1 drachm. Triturate thoroughly and add Paraform 3 grains, Glycerin 10 minims, Zinc Oxide drachms. Mix.

Formaldehyde Tablets for **internal** administration contain Paraform ¼ grain, Milk Sugar 2 grains, Citric Acid, Peppermint an Sugar, *q.s.* to 10 grains. Useful antiseptic to the mouth.

Formamint Tablets are said to contain 0·01 Gm. 'Formaldehyde.'

The Trade Mark was avoided, *i.e.*, ***removed from the register*** during the war.

Furfural $C_5H_4O_2$ = 96·032. *Syn.* FURFUROL, PYROMUCIC ALDEHYDE, ARTIFICIAL OIL OF ANTS.

A liquid of aromatic odour, colourless but turning red on exposure t light. Manufactured by distilling various Cellulose fibres, wood, straw etc., with dilute Hydrochloric or Sulphuric Acid. In U.S.A. corncobs oat hulls are used. It is used in making synthetic Resins or Rubber substitutes.—*vide* C. D. Comm. Compendium.

ALKALOIDAL NOTES

'ACTIVATED' ALKALOIDAL SOLUTIONS.

It has been noticed by many observers that alkaloidal salts i presence of alkali have increased toxicity and activity. One example is the clinical use of 0·5% Cocaine Hydrochloride solutio with the addition of 0·5% Sodium Bicarbonate (*cf.* **Injectio Cocainæ et Sodii Bicarbonatis**), which is stated to be mo efficacious and anæsthetic in effect than even a 4 or 5% plain Cocain Hydrochloride solution. Other alkaloids, showing experimental greater toxicity with alkali, include Morphine, Quinine, Cinchonidine, Pilocarpine, Scopolamine, Strychnine and Codeine (for furth details see abstracts in the 18th Edition, p. 141).

This effect has been ascribed to changes in the surface tension the liquid, but it is more reasonable to suppose that it is due to th presence in solution of some of the *alkaloidal base.* It can be show that many alkaloidal salt solutions, on making neutral or slight alkaline, give no precipitate and yet contain alkaloidal base whic can be extracted with a suitable solvent. From consideratio of solubility, all the alkaloid can hardly be present as base, and w suggest that the solution contains an equilibrium mixture of base and salt. Removal of the base, *e.g.*, with a solvent (or by *absorption, in vivo*) favours the further and complete decomposition of the salt. If this explanation of the 'activation' is correct, it implies that the alkaloid itself is more readily absorbed by the tissues than is a corresponding salt.

We have shown in the cases of Cocaine, Quinine, and Strychnine Hydrochlorides that a solution in contact with blood contains free base. This is in agreement with the suggestion of Overton (Ztschr. f. Physikal Chemie, 1897, p. 207), that, in the organism, the salts of the alkaloids are split up by the alkali of the blood and lymph, their action being due only to the free alkaloids. In support of this view, there are also the observations of Gros (Arch. f. exp. Path. u. Pharm., 1910, p. 80), who compared the anæsthetic effect of some bases and their salts, and in nearly every instance the base was shown to be considerably more active.

(W. S. van Leeuwen, Jl. Pharm. & Exp. Therap., '24, 21 and 25, imagines a loose state of combination between the alkaloids and blood serum constituents.)

The following, therefore, appear to be the conclusions :

(*a*) On injection, all alkaloidal salt solutions, before having physiological effect, *must be decomposed by the alkalinity of the blood, with the production of free base.*

(*b*) Alkaloidal salt solutions containing alkali are more active than those of the salt alone, since they already virtually contain free alkaloidal base in solution.

Basic Alkaloidal Preparations.

The following preparations are the result of attempts to apply in practice the idea that the alkaloidal base is more active than its salts.

***Borocaine** (T.M. 465359).—This is Novocain (Ethocaine) Borate, first examined in 1912 by Gros (Arch. f. exp. Path. u. Pharm., 1912, p. 132), who found it to have the greatest anæsthetic effect of the five Novocain salts tested. The borates, being the salts of a very weak acid, are readily hydrolised, so that their aqueous solutions contain alkaloidal base.

The compound was reintroduced by Copeland and Notton (B.M.J., ii./25,547), who found it superior to Cocaine and other Cocaine substitutes.

(*See Novocain for a more complete description of this compound.*)

Addition of Sodium or Potassium Bicarbonate to Novocain solution renders it almost equal to Cocaine in mucous membrane anæsthesia.—W. R. Meeker, Jl. Lab. & Clin. Med., Nov. '25,139, per Pres., Apl. '26,146.

Quinine-Mannitol.—This is a concentrated solution containing Quinine base, Boric Acid, and Mannitol, and is suggested for intracutaneous or intravenous injection in place of the acid salts of Quinine at present in use. (For further details of composition, dose, and toxicity, see Quinine Chapter, *post.*) On dilution with water or blood, the solution becomes slightly alkaline, owing to the liberation of Quinine base by hydrolysis.—W. H. Martindale, L. i./26,455.

***Steriloids** (T.M. 260647) **of Alkaloidal Bases.**—These are actual sterile solutions of alkaloidal bases in suitable solvents. It is unfortunate that, owing to limitations of solubility, they contain only minute amounts of alkaloid, and yet in some instances, *e.g.*, with Atropine and Morphine, they have been found as effective as much larger doses of the corresponding salts (*v. infra*).

***'Steriloids,'** Prepared with 2 Cc. (except where stated) of *No.* 1 *solvent* (1% Sodium Chloride) of Atropine 1/400, 1/200 and 1/100 grain in 1 Cc.; Cocaine 1/60 grain; Codeine 1/16 grain and ¼ grain; Diamorphine 1/50 grain, 1/30 grain (in 2·5 Cc.); Emetine 1/18 grain; Morphine 1/160 grain; Quinidine 1/60 grain, Strychnine 1/360 grain in ½ Cc., 1/180 grain in 1 Cc., 1/90 grain.

***'Steriloids,** containing 2 Cc. of solution in *No.* 2 *solvent* (5% Glucose) have been made of Cocaine 1/50 grain; Emetine 1/14 grain; Quinidine 1/50 grain; Quinine 1/60 grain.

In like manner **'Steriloids,'** using *No.* 3 *solvent* (1% Sodium Bicarbonate), containing 2 Cc. of the solution, have been made of Cocaine 1/30 grain; Codeine 2/7 grain; Emetine 1/9 grain; Morphine 1/160 grain; but in general we should not favour this solvent.

For the data as to solubilities of alkaloidal bases in these solvents and in water, see Edn. XVIII., Vol. I, p. 143.

Uses.—The utility of these alkaloidal base preparations is that prompt effect is produced without calling upon the tissues to break down the medicament injected. We agree the effect may be correspondingly transient, because of course the amounts are in some cases minute, but the injection can be repeated if desired. There is economy in the chemical and the possibility of overdose is reduced to a minimum. The injection of a *minute* amount of the alkaloidal base, producing a prompt effect of the calibre of a much larger amount of the corresponding alkaloidal *salt*, may be of considerable value in 'withdrawal' treatment in the case of drug addicts. The preparations have the added advantage for the medical man that they are outside the provisions of the Dangerous Drugs Acts.

Intravenously, these preparations offer some possibilities. As yet, trials have not been conducted by this route.

Clinical Trials in a small number of surgical cases were made with some of the solutions (in 1924). In particular, the **Atropine Base** in No. 1 Solution was used to check secretion before gas and prior to ether anæsthesia. Doses of 1/400 grain were, as a rule, satisfactory except for very robust patients. It was found necessary to operate within ¾ hour. Atropine 1/400 grain in this basic form was roughly equivalent to 1/100 grain of Atropine Sulphate, given at about the same interval before operation.

The effect with Atropine base passes off more rapidly.

Morphine Base 1/160 grain in No. 1 Solution has been tried afte operations where pain follows, both of slight and medium severity It is remarkable that this small quantity of morphine had some effect: as a rule, sufficient to ensure satisfactory sleep and comfort in women. When used for big men, the patients were restless in coming round from the anæsthetic, but did not, as a rule, complain of pain.

Morphine Base 1/160 grain in half-strength Chloroform Water was also tried with somewhat similar effect.

(The usual routine had been to give ¼ grain of Morphine Tartrate after operation.)

Codeine, ¼ grain, both in the form of base and a customary salt were inadequate in relieving pain in one case.

Base or salt for injection. An editorial note on the author's basic preparations. Enthusiasm well grounded. The same might apply to other drugs, *e.g.*, the Hydrochloride salt of Insulin may not be the ideal form.—L. i./26,451.

ALKALOIDAL PERIODIDES.

The author has prepared numerous Alkaloidal Periodides, in addition to Emetine Periodide, which is fully described in the chapter on Ipecacuanha. A paper dealing with the last mentioned was read by the author in conjunction with J. Graham Willmore at the Royal Society of Tropical Medicine and Hygiene, London, in May, 1923. There would seem to be a field of usefulness for these in the light of results obtained with the Emetine compound. The literature on the chemistry of the Periodides is exceedingly meagre. (Ref.: Jl. Pharm. et Chim. '09, 193.) The following are described in the body of the work:—

	Dose.
Cinchonidine Periodide	1½ to 3 grains.
Cocaine ,, ...	1/40 ,, 1/20 ,,
Codeine ,, ...	¼ ,, ½ ,,
Emetine ,, ...	½ ,, 2 ,,
Morphine ,, ...	1/16 to ⅛ ,,
Papaverine ,, ...	½ ,,
Quinidine ,, ...	1½ to 3 ,,
Quinine ,, ...	1½ ,, 3 ,,
Sparteine ,, ...	½ ,, 3 ,,
Strychnine ,, ...	1/100 ,,

Constitution of the Alkaloidal Periodides.

From experimental work conducted in the author's laboratories it was found that there are two distinct classes of Alkaloidal periodides—those containing hydriodic acid of the type B.HI.I*n*—and those prepared by combination of alkaloid and Iodine only, of the type B.I*n* where B is the alkaloidal base.

Chemically, it is of interest that the latter true periodides with which we are concerned, vary in their *capability of withstanding* treatment with Physiological Acid and *per contra* of *liberating the alkaloidal base* in presence of Physiological Alkali. For further consideration and experimental data, see Edn. XVIII., p. 146.

Behaviour of certain Alkaloidal Periodides towards acid and alkali of physiological strength.

The variation is doubtless referable to the molecular arrangement of the Iodine atoms with the alkaloidal molecule.

Alkaloidal Constituent of the Periodide.	*Probable Formula.*	*Theoretical % Alkaloid for ascribed Formula.*	*% Anhydrous Alkaloid found (by estimation of Iodine.)*	*Anhydrous Alkaloid liberated as % of the Periodide, by*	
				Physiological Acid.	*Subsequent treatment with Physiological Alkali.*
Cinchonidine	$B\cdot I_4$	36·7	37·7	1·9	2·0
Cocaine ..	$B\cdot I_3$	44·3	47·9	1·5	15·7
Codeine ..	$B\cdot I_2$	54·1	58·4	38·5	11·6
Emetine ..	$B\cdot I_6$	38·7	37·8	0·4	2·1
Morphine ..	$B\cdot I_2$	52·9	54·0	17·1	9·1
Papaverine .	$B\cdot I_2$	57·2	56·2	0·7	2·3
Quinidine ..	$B\cdot I_2$	56·1	56·1	39·0	12·7
Quinine ..	$B\cdot I_3$	46·0	48·2	1·6	9·3
Sparteine ..	$B\cdot I_3$	38·0	36·5	12·4	3·0
Strychnine .	$B\cdot I_2$	56·8	56·8	13·6	10·0

Experimental Details.

In making these determinations, 1 Gm. of the periodide was repeatedly shaken with 200 Cc. of 0·2% of Hydrochloric Acid during 4 hours at 40° C. The insoluble residue was then again shaken during 4 hours at 40° C. with 200Cc. of Physiological Alkali.

The Physiological Alkali was a solution containing 1·34% of Sodium Bicarbonate and 1·14% of Sodium Carbonate ($+10H_2O$), as this has a Hydrogen Ion concentration similar to that of the intestinal fluid, ($pH=9·5$).

Pharmacology and Uses.—For further details see each individual Periodide.

Alkaloidal Mercuric Iodides.—Preparation in crystalline condition Those of Caffeine, Theobromine, Cocaine, Sparteine, Quinine, Morphine Codeine, Pilocarpine and Strychnine, contain no Chlorine and no water o crystallisation.—P.J. ii./22,294.

ALOE.

Aloe (*B.P.* '14) is from *A. chinensis* (*Liliaceæ*), and *A. Perryi* and other species, known commercially as Curacao, Socotrine or Zanzibar Aloes. 'Aloe' FR. CX. and P. JAP. is from 'various species.' P. Ital. IV. mentions *A. Socotrina*, *A. ferox*, and *A. spicata*. P. Helv. specifies *A. ferox*.

For analytical data on Aloes see Vol. II.

Dose.—2 to 5 grains (**0·12 to 0·3 Gm.**).

Uses.—Aloes and Aloin act chiefly on the lower bowel. They are employed with soap and with iron and with strychnine in the treatment of habitual constipation.

Aloes, in dose of 10 grains a day, is very unsafe for pregnant women—very likely to produce abortion.—P.J. ii./24,343.

The **Natal** or **Cape** varieties of Aloes (from *A. ferox*) are of vitreous fracture, and characteristic odour, and mostly used for veterinary purposes. Have been found to contain as much as 6% Barbaloin.

Extractum Aloes (*B.P.* '14).

Dose.—1 to 4 grains (**0·06 to 0·25 Gm.**).

Barbados Aloes yield 60 to 70% of Extract, *cf. Vol. II.*

Decoctum Aloes Compositum (*B.P.* '14).

Dose.—½ to 2 ounces (**15 to 60 Cc.**).

A 1% solution of the Extract, with Myrrh and Potassium Carbonate, Licorice and Compound Tincture of Cardamoms. A purgative and used in amenorrhœa.

Pilula Aloes et Ferri (*B.P.* '14).

Dose.—4 to 8 grains (**0·25 to 0·5 Gm.**).

Exsiccated Ferrous Sulphate 1, Aloes 2, Compound Cinnamon Powder 3·5, Glucose Syrup 3·5 or *q.s.*

Tablets are also prepared 4 grains each. An excellent remedy for habitual constipation.—W. W. W.

Pilula Triplex. *Dose.*—1 to 3 pills.

Aloes Extract 2 grains, Podophyllin ¼ grain, Mercurial Pill 1 grain, Cathartic with particular action on the liver.

Ⓟ**Pilula Aloes, Cascara et Hyoscyami.**

Dose.—4 to 8 grains (**0·25 to 0·5 Gm.**).

Extract of Aloes, Extract of Cascara, Extract of Hyoscyamus, equal parts.

$\boxed{P1}$**Pilula Aloes, Nucis Vomicæ et Belladonnæ.**

Extract of Aloes 1, Extract of Nux Vomica ½, Extract of Belladonna ¼. In grains for one pill.

Tinctura Aloes (*B.P.* '98).

Dose.—1½ to 2 drachms (**6 to 8 Cc.**), or ½ to 1 drachm (**1·2 to 4 Cc.**) repeated. Extract of Barbados Aloes 1 in 40.

Pruritus vulvæ,—tampons saturated with this give relief.

Glycerinum Aloes.

Evaporate Aloes Tincture 6 to 3, gradually adding Glycerin 30. Pigment for bed sores and anal fissures.

Dewees' Emmenagogue Mixture (H.).

Dose.—½ ounce thrice daily.

Tincture of Aloes 8, Tincture of Ferric Chloride 6, Tincture of Cantharides 2, Ammoniated Tincture of Guaiacum 3, Syrup to 90. Largely employed in the U.S. in functional and organic amenorrhœa.

Aperitive Elixir. *Dose.*—½ to 1 drachm (**2 to 4 Cc.**)

Tincture of Aloes 2, Tincture of Myrrh 2, Tincture of Saffron 1.

Tinctura Aloes Composita, P. AUSTR.

Average dose.—1 to 2 drachms (**4 to 8 Cc.**).

Cape Aloes 15, Gentian Root 2½, Rhubarb 2½, Zedoary Root 2½, Saffron 2½, Alcohol (70%) 500.

For threadworms, Aloes with carminative in the morning early. After evacuation an enema of 3 tablespoonfuls of salt—repeated during 10 days or so. Avoid salads and watercress.

Pulvis Aloes cum Canella, P. DAN, 1836. *Hiera Picra.*

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**).

Hepatic Aloes 16, White Canella Bark 3. Much used as a domestic emmenagogue.

For insect bites a saturated solution of Aloes in Tincture of Tolu. —F. W. Cock, B.M.J. ii./18,256.

Aloin, $C_{16}H_{16}O_7$, $3H_2O$=374·176.

Dose.—½ to 2 grains (**0·03 to 0·12 Gm.**). ¼ grain may be considered an aperient, and 1 grain a full purgative dose. The former is U.S. *Average dose.* In a pill with hard soap. Assuming Extract of Aloes to contain on an average 25% of Aloin, it follows that ¼ grain of the latter is equivalent in activity to 1 grain of Extract.

Has been tried as *hypodermic purgative,*—½ grain in warm water 30 minims, but it is not always satisfactory.

A principle obtained officially from Barbados or Socotrine Aloes in odourless yellow crystals, having the characteristic taste of aloes; *soluble* in cold water, 1 in 140 (Barbaloin), in alcohol 90%, 1 in 20, almost insoluble in Ether. Aloes contains as much as 30% of Aloin.

Oxidation of Aloin and of other constituents of aloes with alkali persulphate also by Caro's Acid and Sodium Peroxide.—**E. Seel, J.C.S.A. i.,20,67 *et seq.***

P1 **Pilula Aloin Composita.**—For constipation, Sir A. Clark recommended aloin, extract of nux vomica, sulphate of iron, myrrh and soap, of each ½ grain in a pill taken ½ hour before last meal of the day. If fæces be hard and there be no special heart weakness add ½ grain of ipecacuanha, and should griping be caused add also ½ grain of extract of belladonna.

P1 **Tablets, Anti-Constipation.**—The above without Ipecac.

P1 **Pilula Aloin, Strychninæ et Belladonnæ.**

Dose.—1 or 2. Aloin ⅕, Strychnine $\frac{1}{60}$, Alcoholic Extract of Belladonna ⅛, in each; in fractions of a grain, make one pill; of a gramme, fifteen pills.

P1 **Tablets of Aloin Compound** represent the latter with Ipecacuanha $\frac{1}{16}$ gr. **Tablets of Aloin** (Plain), $\frac{1}{10}$ and ½ grain.

P1 **Pilulæ Laxativæ Compositæ, U.S. VIII.** 100 pills contain Aloin 1·3, Strychnine 0·05, Extract of Belladonna Leaves 0·8, Ipecacuanha 0·4, Glycyrrhiza 4·6 Gm., Syrup, *q.s.*

Suppositoria.—Fr. Cx. Aloes 0·5 Gm., Cacao Butter 2·5 Gm.

Ⓟ **Marienbad Tablets.** Published formula:—Aloes Extract 1·25, Rhubarb 1·25, Podophyllin 0·25, Cascara Extract 0·50, Belladonna Extract 0·12. Divided into 50 tablets, keratined and silvered.—Pres., Mar., 1907.

ALUMINIUM.

Al=26·97.

Alumen Purificatum (*B.P.* '14) is Aluminium and Potassium Sulphate (Potash Alum) $Al_2(SO_4)_3\,K_2SO_4,\ 24H_2O=948{\cdot}772$, *or* the Ammonium Salt $Al_2(SO_4)_3(NH_4)_2SO_4,\ 24H_2O=906{\cdot}604$.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**).

Soluble 1 in 10 of water.

Uses.—As an astringent for local application. Ulcers on the lips are cured by its use. As a mouth-wash its solution is possibly not desirable unless it be quickly removed by rinsing. Destruction of the teeth may occur.

Injectio Aluminis L.H. for vaginal use. 60 grains in 1 pint.

Whooping cough has been treated with 1 to 2 drachm doses of 2% Alum Solution alternate hours—also combined with adequate doses of Chloral Hydrate.—B.M.J.E. i./20,13 ; Pres. Feb./21, p. 110.

Poisoning by Aluminium produces a rather slow intoxication. In a case contracted by a metal worker there was loss of memory, tremor, jerking movements and impaired co-ordination, also chronic constipation and incontinence of urine.—J. Spofforth, L. i./21,1301.

A solution of Alum useful to destroy slugs, snails, and their eggs without harming the plants.—P.J., i./25,638.

Alumen Exsiccatum (*B.P.* '14). *Syn.* ALUM USTUM, BURNT ALUM, is made by heating Potash Alum until it has lost 45 to 46% of its weight. It may also (U.S.) be made from Ammonium Alum.

Glycerinum Aluminis (*B.P.* '14). 1 in 6. An astringent throat paint.

Ophthalmic Lamels contain $\frac{1}{250}$ grain of alum in each.

Points of Alum, also of **Copper Sulphate**, mounted in wooden cases, are prepared for ophthalmic and other uses.

Aqua Hæmostatica, P. Ital. IV. ACQUA DEL PAGLIARI.

Alum (Potash) 80, Benzoin Tincture 10, Benzoic Acid 2, Water to 1,000. Filtered after allowing to deposit. If with 10% Sodium Chloride it is POLLACCI'S modification.

Aluminii Sulphas, *Syn.* ALUMINIUM TRISULPHATE. $Al_2(SO_4)_3+16H_2O=630{\cdot}388$.

White crystalline powder or lumps made by dissolving freshly precipitated Aluminium Hydroxide in Sulphuric Acid. ***Soluble*** 1 in 1 of water nearly. Loses about 45·7% water of crystallisation on heating to 200° C.

Incompatible : alkalis and alkaline carbonates.

Liquor Aluminii Acetici, P.G. VI., P. AUSTR., P. JAP. IV. *Syn.* BUROW'S SOLUTION, **Solutum Aluminii Acetici,** P. BELG.

Dissolve Aluminium Sulphate 100 in Water 270 without heat. Filter and add Water to Sp. Gr. 1·15, and while constantly stirring pour in by degrees Precipitated Calcium Carbonate 46, mixed with Water 60, and finally Dilute Acetic Acid (30%) 120 in portions. Set aside in an open dish until gas evolution ceases (P.G. VI. says at least 3 days), stirring frequently, then decant, press the sediment (without washing), filter the solution and dilute to Sp. Gr. 1·044 to 1·048. Contains 7·3 to 8·3% of Basic Aluminium Acetate $Al(C_2H_3O_2)_2OH = 162·026$.

Diluted with twice as much water, thus making a 2½% solution, it has been used as an antiseptic lotion, and gauze impregnated with a 5% solution has been used as a dressing.

1 to 3 of orange flower water forms a pleasant mouth lotion.

Acute otitis externa and media has been treated with this liquor diluted 4 times.

The P.G. Liquor diluted 1 drachm to the ounce forms an approximate 1% solution. It is largely used on the Continent in clinics in place of the Boric Lotion used here. It is non-toxic, non-irritant and markedly astringent. For moist fomentations and as the medicament for a bath in which to place hand or foot for continuous irrigation. In dermatitis whatever be its cause, in suppurating open wounds, and in cutaneous erysipelas there is nothing to equal fomentation with it. An objection is, however, that after three weeks' continuous irrigation tissues become very hard. Twenty-four hours' immersion in warm normal saline (one drachm to the pint) largely removes the indurated state.—H. F. Waterhouse, B.M.J. ii./10,62. **Personally, we believe Boric Acid Lotion is better.**

Note.—Burow's Solution, Ph. Ned. V., is made by interacting between Potash Alum and Basic Lead Acetate Solution and in consequence contains some Lead Sulphate (0·6%) in solution and some undissolved. It contains only 1% approx. Basic Aluminium Acetate.

Aluminii Acetas. $Al_2(OH)_2(C_2H_3O_2)_4$ (?) = 324·052.

White powder slightly *soluble* in water.

Is used as a desiccant and deodorant in powder or with glycerin.

Note.—**Neutral Aluminium Acetate** $Al_2(CH_3COO)_6 = 408·284$ is only known in Solution. If such a Solution be evaporated below 38° C. the basic salt probably of formula $Al_2(OH)_2(CH_3COO)_4$, soluble in water, is obtainable as in the Liquor above. If on the other hand the Solution be boiled the basic salt, probably of formula $Al_2(OH)_4(CH_3COO)_2$, is thrown out, *i.e.*, it is insoluble in water.

For ophthalmia neonatorum 10% Ointment has been used applied between the lids every hour in place of Silver **Nitrate** drops.

ŒDEMATOUS SWELLING: antiphlogistic treatment with cooling applications, boric acid and acetate of aluminium.—B.M.J.E. i./10,36.

As an *anthelmintic* Aluminium Subacetate has been used in treatment of oxyuriasis. Dose for an adult 1 Gm. 3 times daily for three days; for children 0·5 Gm. twice daily—preceded in each case by a dose of Calomel.—W. T. Schmidt, per Jl. Trop. Med., May 1/23,146.

Aluminii Aceto-Tartras,—*Syn.* ALSOL.

Made by dissolving Aluminium Hydroxide freshly precipitated in Acetic and Tartaric Acids. We use 312, 360 and 450 parts respectively.

In shining masses, ***Soluble*** in water. An astringent and antiseptic employed in 1 or 2% solution as mouth wash and gargle. Also for wound treatment the same strength.

Solubility.—We find that a solution as strong as 50% in water can be made. Powder finely, and allow to macerate a few hours with shaking. The salt is more rapidly soluble in Ammonium Chloride and in Ammonium Acetate Solutions.

Liquor Aluminii-Aceto-Tartratis, *Syn.* **Aluminium Aceto-Tartaricum Solutum, P. Helv.**

Dissolve Aluminium Sulphate 30 in warm water 100, cool and add Acetic Acid (30%) 36, then, with stirring, Calcium Carbonate 13 in water 35, allow to stand 24 hours with occasional shaking, filter off the solution and add to every 100 of filtrate Tartaric Acid 3½.

Specific Gravity 1·055 to 1·059. Contains about 10% Aluminium Aceto-Tartrate. According to P. Helv. this is to be supplied when Liquor Aluminii Acetatis is ordered. This formula contains Aluminium Sulphate and an excess of Acid.

P.G.VI. contains 45% Aluminium Aceto-tartrate, and is prepared by dissolving Tartaric Acid 15, in Aluminium Acetate Solution 500, and evaporating on the water bath to 114 and Acetic Acid 6 is added. Filter after standing in stoppered bottle, protected from light. Sp. Gr. 1·26 approx.

Stomatitis may be treated by frequent rinsing of the mouth with this Solution and by using Salol as a paste to the parts.

Liquor Aluminii Formatis.—We find this may be prepared by precipitating the Hydroxide from 630 of Aluminium Sulphate crystals, and dissolving in 1152 of 25% Formic Acid. Thus made, it contains the equivalent approximately of ⅛ of its weight Aluminium Formate taken as $Al_2(H.COO)_6$. Other formulæ have been given for Aluminium Formate. Employed like the foregoing as a gargle, diluted 1 to 3% with water.

Aluminii Chloridum, $Al_2Cl_6,12H_2O=482·874$.

Dose.—2 to 4 grains (**0·12 to 0·25 Gm.**).

A white, amorphous deliquescent powder. Has been found of distinct service in locomotor ataxy; relieves the lightning pains. May be combined with other drugs.

Liquor Aluminii Chloridi. Dissolve Aluminium Chloride ($+12H_2O$) 20, in water to produce 34 by volume=42·5% by weight.

Pilula Aluminii Chloridi.—*Martindale.*—2 grains in each.

Dose.—1 to 2 thrice daily. These are convenient for treatment, being portable.

Aluminii Chloras, $Al(ClO_3)_3=277·341$.

Deliquescent crystals containing either 6 or 9 H_2O.

A 25% solution **may be prescribed. This further diluted 1 to 25** forms a 1% mouth wash or spray in throat affections, and is a prophylactic against infection.

A 20% solution of the Chlorate in Water or Glycerin has been used on tampons for leucorrhœa or cervical catarrh.

Aluminii Hydroxidum.

Prepared by pouring hot potash alum solution into a hot solution of Sodium Carbonate.

***Alocol** (T.M. 406220) **Tablets.** COLLOIDAL ALUMINIUM HYDROXIDE TABLETS. *Dose.*—Two to be dissolved in the mouth half an hour before and after each meal.

For treatment of flatulence, hyperacidity, pyrosis and allied gastric disturbances.

***Alumnole** (T.M. 215948) is aluminium naphthol-sulphonate.

Manufacture.—By interaction between Barium Betanaphthol Sulphonate and Aluminium Sulphate Solutions. The Barium compound made by warming Betanaphthol 10 in Sulphuric Acid 8 on a water bat until a sample dissolves clear in water, then diluting and saturating wit Barium Carbonate, filtering and evaporating to dryness (Patent 10 66 expired 1902).

Lotion, gargle and ointment ½ to 2% in pharyngitis, rhinitis, ozœna, an gonorrhœa

Soldering Aluminium.—A large number of solders and appropriat fluxes are given, C.D. ii./07,631, to which reference should be made by thos seeking information.

Thermit is a mixture of powered Aluminium and magnetic Iron Oxid used in welding Iron and Steel and in repairing broken steel casting

Duralumin — An alloy of Aluminium slightly heavier than the pur element.—Its strength is about the same as mild steel Practically non corrodible. Recommended for surgical appliances, splints, etc.—B.M.J. 1./12,236.

Aluminium Vessels.—Experiments with Aluminium laboratory an kitchen utensils. These stood tests well—no suspicion of conveying poisonou metals. Aluminium is not appreciably acted on in cooking. It is, of course a good conductor of heat Aluminium vessels when not in use should b kept perfectly dry. Water, for example, should not be left in soldiers' wate bottles. It is stated that the Aluminium used contains only 2% of impurities —L. i./13,54.

Pulvis pro Pedibus, P. Helv.

Potash Alum 15, Talc 85, in fine powder. For tender feet. Anothe useful form of **Foot Powder** is: Talc 2, Boric Acid 2, Orris 1, Zin Oleate Powder 1.

Kaolin (*B.P.* '14). Bolus Alba, P.G.V., Ph. Ital. IV., P. Jap.

Native white aluminium silicate, $H_2Al_2Si_2O_8+H_2O=258{\cdot}69$ purified by elutriation from sandy matter; it is a smooth whit powder and is a useful absorbent for irritation of the skin. It i unacted upon by most chemicals, hence used for making pills of Silve Nitrate, Gold Chloride, and Potassium Permanganate (*see* Unguentum Kaolini). It is useful for sprinkling on to the filter paper in clarifying liquids. It should leave not less than 85% non-volatile residue o ignition, nor should it contain marked impurity of iron.

Internal Use:

Dose.—¼ to 1 ounce (8 to 30 Gm.). 'Spoonfuls' are mentioned with water, milk or emulsified with gum. Best on empty stomach

Both Talc and Kaolin have been given as substitute for Bismut in gastric and intestinal affections. Talc is insoluble and not affecte by acids. In diarrhœa of phthisis upwards of 200 Gm. *p.d.* Doe not constipate like bismuth.

ASIATIC CHOLERA well treated by Kaolin 100 Gm., water to 250 Cc. ½ pin doses were given ½ hourly for the first 12 hours, the second 12 hours severa glasses were taken. Vomiting ceased and patients improved. Rectal injections of the same suspension also given. Acts mechanically. Also good i diphtheria, ptomaine poisoning, bacillary diarrhœa.—R. R. Walker, Pro R. Soc. Med. Oct. 21; L. ii./21,273,300. Hypertonic Saline in conjunctio might be tried in typhoid.—B.M.J. i./21,640.

Of 35 cases of cholera treated with Kaolin alone only one died, wherea of 41 receiving hypertonic salt solution 9 died, and of 24 receiving salt an Kaolin 7 died. Given by the mouth in a suspension consisting of 800 Gm Kaolin in a litre of water, 3 ounces being given every half-hour until vomitin and diarrhœa abate, then continued every hour and then every two hours up to 12 or 15 hours. Renders bacteria and toxins harmless by a process of adsorption.—B.M.J. i./26,440.

More efficacious than injections of antiserum, Iodine, or Hypertonic Saline. Mortality in cholera camps dropped from 44 to 3%. Tumblerful of emulsion containing 100 Gm. Kaolin in 250 Cc. cold boiled water given every half-hour or hour for 6 doses or more and continued for next few days with smaller dosage.—I.M.G., Feb. '26,93.

Osmo Kaolin. *Syn.* COLLOIDAL KAOLIN. *Dose*:—A teaspoonful or more in water, two or three times a day, gradually increased, if required. If necessary, a little aperient is given at the same time. The preparation is a very efficient absorbent of bacteria and toxins. Has also been tried in cases of rheumatism and gout.

Used with advantage in chronic intestinal conditions, and for healing ulcerated mucous membrane. A prescription is:—**Collasan** 3½ ounces (a variety in commerce), Tragacanth Mucilage 1 ounce, Peppermint Oil 10 minims, water 8½ ounces—a wineglassful every 6 hours.—A. C. Jordan L. i./23,432.

Colloidal Kaolin should contain no organic or inorganic toxic matters and should yield no bacterial growth either aerobically or anaerobically.—A. White-Robertson, P.J. ii./22,396.

Sil-Al.—*Dose*, 1 drachm (4 Gm.) increased, in water half an hour before meals, is for the same purposes as the above.

Vaginal insufflation of the powder with subsequent douching to check discharge has been tried. The dry method is claimed to have a prophylactic value—by absorbing irritant discharge the production of fresh erosion is prevented, and those existing have an opportunity of healing.

✱ **Kaylene** (T.M. 449072).—*Dose.*—A dessertspoonful or more in ½ tumbler of hot water night and morning. For children, 1 teaspoonful. Described as an activated Colloidal Aluminium Silicate absorbing toxins and by its mechanical action replacing intestinal Antiseptics, also available as **Laxative, Mint** and **Sweet Kaylene.**

Operative Skin Preparation and Treatment.

All clean wounds heal better if kept dry. Moisture undoubtedly favours or provokes inflammation—water is, of course, a *sine qua non* for the life of vital organisms. It is best to clean the skin with Ether Soap, then go over with Turpentine, then with Biniodide in Spirit, finally cover with Sterile Kaolin and bandage with a dry sterile compress, but no protective Oil Silk, Gutta Percha Tissue, etc., to keep moisture in.—L. i./13,1052.

Cimolite is a special preparation, agreeably perfumed.

Fullers' Earth (China Clay) is a similar silicate, containing traces of Iron and Magnesia.

Terra Alba in commerce is variously Kaolin, Gypsum, Burnt Alum or Magnesia, in preference the first.—W. H. M.

Westcott drew attention to the frequent deaths of infants by tetanus when Fullers' Earth has been applied to sores on navel and nates—there may be serious risk of infection of more than one kind from the use of this unsterilised earth. Warning should be given to the poor not to use this. Boric Acid with Zinc Oxide and Starch is safe in use.

Fulmar Oil.—The oily contents of the stomach of the fulmar petrel, used as dressing to the umbilical cord by the islanders of St. Kilda, might possibly cause tetanus.—B.M.J. ii./26,80,137.

Unguentum Kaolini.
Soft Paraffin 1, Hard Paraffin 1; melt, add Kaolin 1, and stir till cold. Spread on rag to apply on abraded skin, it allays irritation. Also as pill excipient, *v. ante.*

Asbestos in intimate contact, *e.g.*, with Solutions, has an action on various substances. Diastase, *e.g.*, is removed from liquids containing this ferment in 24 hours,—the Asbestos itself becoming active. Starch Paste (0·5% in water) in presence of Asbestos, after 3 months, shows no trace of Starch in Solution,—it is converted into Sugar. The Asbestos also gives no Starch reaction. It reduces the radio-activity of radio-active waters and of Thorium Nitrate Solution. Gelatin loses its power of setting again. It also removes Alkaloids, Proteins and Hormones (*e.g.*, Adrenalin) from Solutions. —B.M.J. ii./13,1362,1376.

Extraction of Morphine and other alkaloids by means of an insoluble Silicate of Metal of the Aluminium group, *e.g.*, Fullers Earth. Subject of patent.—P.J. i./14,32.

Talc. A native foliaceous magnesium silicate; that from the Tyrol—Venetian Talc—is soft and unctuous.

Talcum Purificatum, U.S., is the above purified (by hydrochloric acid), and it is intended only as a filtering medium.

French Chalk is a harder silicate of magnesium.

Kieselguhr, a diatomaceous or infusorial earth, known as white peat, burnt produces a light absorbent powder. It is used in making tooth pastes. **Ceyssatite** is a calcined siliceous earth from Ceyssa (Auvergne).

Terra Silicea Purificata, U.S. Purified Kieselguhr is prepared by means of dilute hydrochloric acid.

Portland Cement is prepared by incinerating a mixture of Limestone and Clay. Consists mainly of Calcium and Aluminium Silicates. Possesses the property of solidifying to a stone on moistening with water—presumably owing to formation of Hydrous Calcium—Aluminium Silicates and Calcium Aluminates. A large proportion of the lime is, however, present in the cement when 'set' as Calcium Hydroxide. Might be used for its scouring effect on wounds.—L ii./17,368.

AMMONIUM.

$NH_4=18{\cdot}04$.

Ammonii Bromidum (*B·P.* '14). $NH_4Br=97{\cdot}956$.

Dose.—5 to 30 grains (**0·3 to 2 Gm.**).

Small colourless crystals ***Soluble*** in water 2 in 3, less in alcohol (1 in 15). ***Incompatible*** with mineral acids and silver nitrate.

Limit of Lead content as impurity—10 parts per million.

Flavoring.—Glyl Vanillæ, Glyl Rosæ (excellent); Syrupus Zingiberis, Extractum Glycyrrhizæ Liquidum.

Uses.—Possesses similar sedative properties to those of the other bromides, and is thought to cause less depression.

In sea sickness Ammonium Bromide, beginning a day or so before the voyage, in doses of 20 grains in Chloroform Water with 15 grains of Sodium Bicarbonate thrice a day found useful.—Yeo

In tinnitus a course of ammonium bromide with Syrup of Glycerophosphates does well in some cases. The Bromide at bedtime.—Sir **James Barr.**

Tablets, 5 grains (0·3 Gm.) and 10 grains (0·6 Gm.) are made.

Effervescent Ammonium Bromide.

Dose.—1 drachm. Contains 5 grains.

Linctus Ammonii Bromidi. *Syn.* **Elixir Ammonii Bromidi.**

Dose.—1 to 2 drachms (4 to 8 Cc.). Contains 10%.

A palatable method of administering for throat affections.

Mistura Ammonii Bromidi, Phenazoni et Caffeinæ.

Dose.—One ounce (30 Cc.).

Ammonium Bromide 10 grains, Phenazone 10 grains, Caffeine Citrate 5 grains. Chloroform Water to 1 ounce.

Ordinary headache is rapidly relieved by this, repeated in two hours if necessary.—A. P. Luff, B.M.J. i./14,635.

Pastilli Ammonii Bromidi. 1 grain in each with Glyco-gelatin basis. For whooping-cough and throat affections.

Trochisci Ammonii Bromidi with Gum basis, containing 1 grain each, are very useful in asthma and for tickling cough.

Ammonii Carbonas (*B.P.* '14).

$NH_4HCO_3 : NH_4NH_2.CO_2 = 157{\cdot}112$.

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**).

White masses with ammoniacal odour and alkaline taste, consisting of **Ammonium Bicarbonate** and Carbamate. A stimulant, carminative and expectorant.

Soluble 1 in 4 water, 1 in 5 glycerin.

Incompatible with acids, iron salts and salts of alkaline earths. For equivalents to acids *v.* Neutralisation Table.

In broncho-pneumonia ½ to 1 grain doses useful, combined with a little potassium iodide or ammonium chloride, tincture of nux vomica and syrup of tolu. Even grain doses for infants of six months.—Cautley.

In BRONCHITIS 30 grain doses were advised by the late Sir L. Brunton as emetic. Has advantage of being a stimulant:—

'In smaller doses it stimulates the secretion of gastric juice, may be used in atonic dyspepsia, flatulence, etc., as a substitute for alcohol. From its power of stimulating the respiratory centre, it is employed as a stimulating *expectorant* in chronic bronchitis, in the broncho-pneumonia of children, and in asthma depending on cardiac disease.'

Powdered Ammonium Carbonate is unsuitable for dispensing, especially if bottle is frequently opened, Ammonium Bicarbonate being formed. A 1 in 8 solution is found to be stable.—P. A. W. Self and C. E. Corfield, P.J. i./26,132.

Ammonii Chloridum (*B.P.* '14). $NH_4Cl = 54{\cdot}497$

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

White crystals soluble 1 in 3 of water.

Liquid extract of liquorice disguises its nauseous taste.

Incompatible with carbonates of alkalis and alkaline earths.

Flavoring.—Glyl Rosæ, Glyl Coriandri, Syl Lavandulæ, Syl Aurantii Amari; Extractum Glycyrrhizæ, Syrupus Tolutanus.

For use as an anti-alcohol remedy, *see* Alcohol.

Lotio Evaporans *Syn.* **Lotio Ammonii Chloridi,** GT. ORM. H.

Ammonium Chloride 15 grains, Alcohol 90% 1 drachm, Water to 1 ounce.

Tablets, 3 and 5 grains; also 3 grains with Borax 2 grains.

Trochisci Ammonii Chloridi, T.H. 'F.' 2 grains, marked 'M.A.' One every 3 hours useful in congestion of the pharynx and larynx, loss of voice arising from cold and bronchial cough.

Trochisci Ammonii Chloridi cum Glycyrrhiza.
Contain 3 grains of each. **Tablets** are also made same strength.

Trochisci Ammonii Chloridi Compositi, T.H. Contain Ammonium Chloride 1 grain, Potassium Chlorate 2 grains, and $\frac{1}{4}$ grain approximately of Cubebs. Marked 'C.M.A.'

Vapor Ammonii Chloridi is used in affections of the throat and Eustachian tube.

Inhalers, Ammonium Chloride.—The principle of these consists in combining the vapour of ammonia and hydrochloric acid.

Ammonii Iodidum. $NH_4I=144{\cdot}972$.

Average dose.—5 grains (0·3 Gm.).

A white granular salt containing not less than 99% pure ammonium iodide in minute crystalline cubes, very deliquescent and soon becoming yellow or yellowish brown on exposure to air; odourless when white, with a sharp saline taste and a neutral reaction. ***Soluble*** 1 in less than 1 of Water, 1 in 3 of 90% Alcohol (by experiment). Should be kept from light and air, or free iodine is quickly liberated. It causes less depression than potassium iodide, and is preferred by some for syphilis and rheumatism.

Ammonii Nitras. $NH_4NO_3=80{\cdot}048$ B.P. 1885.

The fused salt is used for making **Nitrous Oxide,** *Syn.* NITROGEN MONOXIDE U.S., LAUGHING GAS. $N_2O=44{\cdot}046$; on heating to 350° F. it splits up into this gas and water vapour.

The gas is passed through a strong solution of ferrous sulphate to remove nitric oxide—the traces of acid being removed by passing through alkali. The gas is considered one of the safest anæsthetics. The heart is not directly affected by its action.

There is no anæsthetic, if carefully given, comparable with nitrous oxide for quietly and pleasantly inducing anæsthesia.

Treatment if dangerous symptoms arise during administration of nitrous oxide.

Dangers arising under gas are almost invariably due to failure of the respiration caused either by obstruction or over dose. Obstruction may result from "falling back of the tongue," from pressure due to engorgement of the thyroid or thymus, or other glands in the neck, or from foreign bodies entering the respiratory passages—teeth, bloodclot, vomit, &c. Over-dose is more likely to occur if the patient's clothing be not loose.

If the breathing stop, give no more anæsthetic, clear the mouth and pharynx with a swab or towel round the finger, pull forward the tongue and compress the lower ribs; if no air enter or leave the chest, place the patient upon his side upon the floor, with a pillow or something equivalent under his shoulders Loosen his clothing, pull the tongue forward and give the tongue forceps to an assistant to keep up the traction. Try to expel any possible obstruction by compressing the lower ribs and abdomen, and then turn the patient upon his back and begin artificial respiration, giving oxygen gas and applying ***amyl nitrite*** or weak ammonia vapour to the nostrils meanwhile. If there be another assistant tell him to give an injection of strychnine ($\frac{1}{30}$ grain) or 1 drachm of ether or both, but do not stop the artificial respiration or waste time over the injection yourself. If no air enter or leave the chest during the artificial respiration, do tracheotomy forthwith, and immediately the trachea is entered resume the artificial respiration and continue it for at least an hour, keeping the patient warm **during this time.** R. D. H. has revised these instructions in some particulars.

Self administration of Nitrous Oxide, accidental death from.—L. ii./20, 1167. Pr. Mar. '22,164.

Nitrous Oxide and Oxygen for major surgery has been extensively used in the U.S. Anæsthesia varies from 11 to 75 minutes.

H. M. Page said the *special indications for the method* are: (1) desperate cases from toxæmia, traumatism or hæmorrhage, if spinal anæsthesia were not used; (2) operations on diabetics; (3) in certain genito-urinary operations. A previous injection of a narcotic with atropine is advised, and failing this atropine alone. Induction recommended to be always done with addition of Ether. H. Bellamy Gardner agreed as to use in diabetics, but not in favour of for abdominal sections.—L. i./13,459.

In *major operations* Teter gives as an average 100 gallons Nitrous Oxide and 20 gallons of Oxygen for one hour's anæsthesia. The temperature of the gases should be 85 to 90° F. His apparatus consists of a stand carrying two cylinders each of Nitrous Oxide and Oxygen and an Ether attachment. The cylinders are in pairs, so that an empty one can be replaced without interfering with the administration.

For operations on regions other than the mouth or nose, injections of Atropine 1/150 to 1/100 grain, Morphine 1/8 to 1/6 grain are given hypodermically 1½ or even 2 hours before the inhalation. Crile and others add Scopolamine 1/200 to 1/100 grain. At first Nitrous Oxide with 2% Oxygen is given with a pressure of 4 to 40 m.m. of Mercury. More or less Oxygen is given according to circumstances—more if patient is cyanosed, less if he struggles. Unconquerable rigidity is controlled by giving Ether—this may occur in about 10% of cases.—D. W. Buxton's "Anæsthetics," 6th Edition.

As anæsthetic in dental work, the average quantity of gas used is 2 to 3 gallons and Oxygen 6—12 ounces. Portable apparatus for the gases. Results in dentistry better than with gas alone.—L. ii./12,1372, 1464.

In military *surgery* Nitrous Oxide and oxygen with rebreathing—stated to be infinitely better than Ether or Chloroform.—H. E. G. Boyle, L. ii./17,667.

Nitrous Oxide has been repeated on the same patient every day for more than a month without harmful effects. Ethylene almost as innocuous. Satisfactory anæsthesia cannot be secured with Nitrous Oxide and Oxygen except with adequate preparation; necessary for the patient to be receptive of the gas type of anæsthesia, *i.e.*, with blood stream capable of receiving and using the gas supplied. Anæsthetist must know metabolism of patient.—F. H. McMechan, B.M.J. ii./26,1118.

Surgical anæsthesia with Nitrous Oxide depends partly on the presence of a certain degree of anoxæmia, and this must impose a limitation on its uses and increase its dangers.—W. E. Brown and Co-workers, Jl. Ph. & Exp. Ther., Aug. '27,269.

Obstetrics. Use of Nitrous Oxide and Oxygen. Only a certain proportion of patients are able to be managed with analgesia in labour. It seems to demand great co-operation on part of patient.—J. Blomfield, Pr. Mar. 22,165. See also Pr. Dec. 1920,402.

Anæsthesia with Nitrous Oxide and Oxygen under pressure. An operating room could be built as a pressure chamber. The pressure would be about an extra half atmosphere and the gas 4, 5 or 6 to 1 of oxygen.—H. H. Dale and Leonard Hill, L. ii./21,326.

Hydrogen, Ethylene and Propylene (and presumably other gases) mixed with Nitrous Oxide **form explosive mixtures** more readily ignitable by heat than similar mixtures with Oxygen.—H. B. Dixon, L. i./27,248.

Ammonii Sulphas $(NH_4)_2SO_4 = 132{\cdot}148$.

Colourless crystals soluble 1 in less than 1 of water. Its chief use is as fertiliser and for fire proofing. It is made by distilling gas liquor with lime, into Sulphuric Acid and is a source of Ammonia for refrigeration and similar purposes.

Ammonii Valerianas. **Ammonii Valeras.** $NH_4.C_5H_9O_2 = 119{\cdot}114$.

Fr. Cx. Another formula,—$NH_4.C_5H_9O_2 + 2C_5H_{10}O_2 = 323{\cdot}274$.

Dose.—1 to 8 grains (**0·06 to 0·5 Gm.**). In masses of flat colourless deliquescent crystals, with a strong valerian odour, very soluble in water and alcohol. A 25% aqueous solution is prepared for dispensing. *Soluté de Valérianate d'Ammoniaque Composé*, a French 'Nerve Tonic' (Fr. Cx. and P. Helv.), is Valerianic Acid 3, Ammonium Carbonate *q.s.* (about 4) to neutralise, Extract of Valerian 2, Water to 100 all by weight. *Dose.*—2 to 4 drachms (7 to 15 Cc.).

Linimentum Ammoniæ (*B.P.* '14).

Solution of Ammonia 1, Almond Oil 1, Olive Oil 2. Shake together. Arachis or Sesame Oil may be used in parts of the Empire.

To make more fluid, mix the Almond Oil and the Ammonia Solution and the Olive Oil afterwards.

'Hartshorn and Oil' is usually Solution of Ammonia 1 and Almond Oil 3, shaken together.

Liquor Ammoniæ. *In Great Britain, Northern Ireland and Irish Free State to be labelled "Poisonous—Not to be taken," and to be supplied in bottle distinguishable by touch.* For further conditions of Sale *v.* p. 42.

Solution of Ammonia (*B.P.* '14) has Sp. Gr. 0·959. This and **Aqua Ammoniæ,** U.S., and **Ammonia Liquida,** Ph. Ned. V., contain 10% by weight of NH_3.

Fr. Cx.—**Ammoniaque Diluée** is about the same strength.

Dose.—10 to 20 minims (0·6 to 1·2 Cc.).

Hypodermically 2 to 6 minims for collapse; or up to 36 minims for snake poisoning.

Internally it is stimulant, diuretic and diaphoretic.

In embolism large doses of ammonia, well diluted, tend to reduce the coagulability of the blood.—Whitla.

Liquor Ammoniæ Fortis. "*Poisonous—Not to be taken,*" *Cf. antea.*

Dose.—3 to 6 minims (0·2 to 0·4 Cc.).

Contains 32·5% by weight NH_3. Sp. Gr. 0·888. (Aqua Ammoniæ Fortior, U.S. X. contains 27 to 29% **Ammoniaque officinale.** Fr. Cx. 20·18%). *Ammoniaca Soluzione*: P. Ital IV. is 20%.

Haber, of Karlsruhe, succeeded in combining atmospheric Nitrogen with Hydrogen, producing Synthetic Ammonia.—Na. Feb., 1911,560. Germicidal action, see *Vol. II.*

Ammonia Sterules, 3 minims in each of strong Ammonia Solution. Encased in cotton wool and Rayon. Intended as a restorative—to be crushed and contents inhaled—a portable form of smelling bottle.

Ocular injury caused by inhalation of 10% Ammonia.—I. Abramovicz, Brit. Jl. Ophth., May, '25,241; per Pres., Feb. '26,63.

Enema Ammoniæ.—Strong Ammonia Solution 1, Water 160 (1 drachm to the pint).

In the treatment of post-operative ileus and intestinal paresis—a sequel of abdominal operations most distressing to the patient. Its effect is enhanced by a dose of Pituitary Extract hypodermically given ½ hour previously. Effects a good motion and discharge of excessive flatus. Not to be used too frequently or in excess of above strength.—T. A. Black, L. ii./16,374.

Liquor Ammoniæ Domesticus (*vel* **Detergens**), **Household Ammonia.** *Signa*—"*Poisonous—Not to be taken.*"

Oleic Acid 1, Alcohol 1, mix and add strong Solution of Ammonia 7, Distilled Water 7; shake well. For use diluted as a detergent of the skin. In the bath 1 in 1,000 to 2,000 softens the water; also for general domestic purposes.

Cloudy Ammonia is made with tap water—for this the gravity of the preparation must not be too light, otherwise the lime salts constituting the 'Cloud' will settle down. We can recommend the following:—Dissolve Castile Soap 1·3, in Water 60, and add Strong Solution of Ammonia 27, Lime Water 0·6, and Water to 100.

Hair Lotion, Erasmus Wilson's.

Strong Solution of Ammonia 1, Almond Oil 1, Spirit of Rosemary (B.P. 1885) 4, Honey Water 2.

For alopecia areata Strong Ammonia Solution 1, Chloroform 1, Olive Oil 1, Spirit of Rosemary to 8, is useful.

Liquor Ammonii Acetatis (*B.P.* '14).

Dose.—2 to 6 drachms (**8 to 24 Cc.**).

Keep in green glass stoppered bottles.

The neutral point may be found by trying effect on a little ammonium carbonate on a watch glass.

U.S. X. is similar and contains 6·5 to 7·5% Ammonium Acetate.

Ⓟ Mistura Anti-Catarrhalis. *Burney Yeo.*

Solution of Ammonium Acetate 3 drachms, Spirit of Nitrous Ether 1 drachm, Opium Tincture 10 minims, Ipecacuanha Wine 5 minims, Camphor Water to 1½ ounces. To be taken at night. Assists action of skin and kidneys.

Liquor Ammonii Acetatis Fortior. B.P. 1885.

Dose.—25 to 75 minims (**1.5 to 5 Cc.**). Ammonium Carbonate 1, Acetic Acid *q.s.*, Water to 4, *i.e.*, approx. 5 times as strong as the *B.P.* '14. Liquor.

Acetate d'Ammonium Dissous (Solution Officinale). Fr. Cx Contains 18·5% by weight of Ammonium Acetate.

Ammonii Acetas.—$CH_3.COONH_4$=77·064.

Dose.—10 to 30 grains (**0·6 to 2 Gm.**).

This salt is obtainable in white crystals, very soluble in water.

Incompatible with mineral acids, alkaline carbonates, potassium chlorate and dichromate, and with mercurous nitrate.

Serviceable in all fevers and in delirium tremens, one drachm every hour at first, reduced gradually.

Choice of a diuretic—Ammonium, Sodium and Potassium Acetates, Citrates and Tartrates, increase osmosis and are diuretics by stimulating the convoluted tubes of the kidney. They draw water from the tissues into the blood stream; they do not irritate the kidneys and may be used even when the organs are acutely inflamed,—they should be well diluted. Useful to combine Spirit of Nitrous Ether with them, which, owing to the Ethyl Nitrite contained in it, is a useful agent in causing dilatation of the different vessels of the kidney. The action of these drugs, *e.g.*, in renal dropsy, should be encouraged by sufficient doses of a watery aperient every day or other day, *e.g.*, Compound Jalap Powder.—B.M.J. i./11,289.

Mistura Febrifuga, N. H. W. (not in E. G. A.). Solution of Ammonium Acetate 2 drachms, Spirit of Nitre 20 minims, Sodium Bicarbonate 5 grains, Chloroform Water to ½ ounce.

Liquor Ammonii Citratis (*B.P.* '14).

Dose.—2 to 6 drachms (**8 to 24 Cc.**).

Prepared by neutralising Citric Acid 10, with Ammonium Carbonate 7 or *q.s.* in Distilled Water *q.s.* to 80. Keep in green bottles.

Liquor Ammonii Citratis Fortior. B.P. 1885.

Dose.—30 to 90 minims (**2 to 6 Cc.**).

Was four times as strong as the present liquor (above).

Ammonii Citras.—$C_3H_4.OH(COONH_4)_3=243{\cdot}16$.

This salt is a deliquescent white powder, diuretic, and acts similarly to the acetate. *Dose.*—30 to 60 grains (**2 to 4 Gm.**).

In PNEUMONIA a mixture of the following: Solution of Ammonium Citrate 30 minims with Potassium Iodide 4 grains and Potassium Citrate 10 grains, in a tablespoonful of water every four hours,—an 8 ounce bottle made up as above proved an efficient treatment for the seventh time in a bad case.

Ammonii Tartras $(CHOH)_2(COO)_2(NH_4)_2=184{\cdot}112$.

White crystals soluble in water.

Irrigation (under Cocaine initially) with 5 to 10, and ultimately 20% solution, in a case of erosion of the cornea,—complete clarification.—M. /08,128.

Lime burns of the eye. Daily irrigation for a period of 15 minutes with a 10% solution of Neutral Ammonium Tartrate recommended. Stated to dissolve the Calcium Carbonate formed in the tissue.—L. i./26,1212.

Spiritus Ammoniæ Fetidus (*B.P.* '14).

Asafœtida 75, Strong Solution of Ammonia 100, Alcohol 90% to 1,000 Distil.

Flavoring.—Syl Menthæ Piperitæ, Syl Limonis, Syl Coriandri (all double dose); Syrupus Zingiberis (not so good).

Spiritus Ammoniæ Aromaticus (*B.P.* '14).

Dose.—20 to 40 minims, for repeated administration; single, 60 to 90 minims.

Contains approximately 2·4% by weight of NH_3. That of U.S. contains Ammonium Carbonate 3·4, Ammonia Water 9, Lemon Oil 1, Lavender Oil 0·1, Nutmeg Oil 0·1, Alcohol 70, Water to 100 and is not distilled.

Liquor Ammoniæ Aromaticus (Simplex).

Ammonium Carbonate 4 ounces, Strong Solution of Ammonia 8 ounces, Terpeneless Oil of Lemon 13 minims, Terpeneless Oil of Nutmeg 54 minims, Alcohol (90%) 6 ounces, Distilled Water 149 ounces. The Oils to be dissolved in the Spirit before adding to the rest of the mixture. The liquor has been suggested as being useful in 'Stock Mixtures'—*i.e.*, for Hospital work, etc., where the saving of Spirit is a consideration.

This preparation mixes perfectly clear with water as distinct from the *B.P.* '14 Spirit. It is not so pungent to the taste as Sal Volatile.

Liquor pro Spiritu Ammoniæ Aromatico.

For dilution 1 with 3 of a mixture of Alcohol (90%) 12 and Water 1.

Dissolve Ammonium Carbonate 4 ounces in Water 20 ounces. Add Strong Solution of Ammonia 8 ounces then Terpeneless Nutmeg Oil 54 minims and Terpeneless Lemon Oil 13 minims in Alcohol (90%) 10 ounces.

May also be prepared for dilution 1 *with* 2 with the same Alcohol mixture as for the '1 with 3' preparation above. In this case proceed as for the latter, but dissolve the Ammonium Carbonate in Water 21½ ounces and the Oils in Alcohol 90% 21½ ounces. This is clearer than the above.

Note.—It is not practicable to make a Concentrated Liquor for dilution with *Water only*. Our experiments show it is not possible to make the Concentrated Liquor much stronger in Alcohol than is contained in the above, as the Ammonium Salts are thrown out.

AMYGDALA AMARA. (*Rosaceæ.*)

Bitter Almond. (*B.P.* '14.)

Oleum Amygdalæ (*B.P.* '14) is expressed from the seeds (Peach or Apricot kernel Oils, or mixtures are sold commercially as Oleum Amygdalæ Persicæ), which yield about 40%*, and the residue is utilised for the production of Essential Oil of Bitter Almonds (**Benzaldehyde**, C_6H_5COH = 106·048, or Oleum Amygdalæ Essentiale *sine* Acido Hydrocyanico). **Benzaldehyde** is official in P.G. VI., U.S. and P. Jap. IV. *Dose.*—½ minim (0·03 Cc.). In latter case produced artificially or as above, containing not less than 85% Sp. Gr. 1·045 at 25° C. B. pt., 179° to 180° C. Tests for hydrocyanic acid and chlorinated products and assay process are given in U.S. Is a flavouring agent—non-poisonous. The Essential Oil containing the Hydrocyanic Acid† to the extent of about 5% is also prepared and must be carefully distinguished from this. (That ordered by U.S. contains not less than 2 or more than 4%.) The glucoside **Amygdalin** $C_{20}H_{27}NO_{11},3H_2O$=511·272 (P. Svec. IX)—crystals soluble in 12 parts of water with slightly bitter taste and neutral action—under the influence of **Emulsin**‡, a constituent in the seeds, of the nature of a ferment, hydrolyses (takes up water) on coming in contact with it, forming grape sugar and $\boxed{\text{P}1}$ Benzaldehyde-hydrocyanic Acid, $C_6H_5COH+HCN$ = 133·064. *Syn.* Benzaldehyde Cyanhydrin $C_6H_5CH(OH).CN$, P.G. VI. This latter compound is decomposed and the Hydrocyanic Acid is removed so as to produce the above Essential Oil suitable for flavouring purposes. A similar body to Amygdalin, or one identical with it, is contained in *Prunus Laurocerasus.* (Cherry Laurel Leaves).

$\boxed{\text{P}1}$ **Aqua Laurocerasi** is standardised (*B.P.* '14, Fr. Cx., P.G.V. and F.I.) to 0·1% Hydrocyanic Acid. It also contains some Benzaldehyde.

For analytical data, vide Vol. II.

It is liable to variation and is unsuited to make eye lotions.—C. M. Caines, P.J. ii./22,91.

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* Content of fatty oil in sweet almonds 45·3-67·1%, average being 58·9%. In bitter almonds 35·5%, to 62·5%, average 51·3%.—P.J. i./23,324.

Bieber's modified Nitric Acid Test indicates presence of small quantities of Peach Oil in Almond Oil. *cf. B.P.* '14.

There is no pharmacological difference between this oil and the expressed oil of almonds. Kernel oil has the higher Iodine No., *vide Vol. II.*

† Ⓟ *Almonds, Essential Oil of (unless deprived of Prussic Acid), also preparations or admixtures containing.*

‡ See also Enzyme Table, Vol. II.

P1 **Aqua Pruni Macrophyllæ** (from fresh *Bakuchi* Leaves). P. Jap. IV. contains also 0·1% Hydrogen Cyanide.

P1 **Aqua Amygdalæ Amaræ** should contain the same amount of Hydrocyanic Acid.—F.I. and P. Jap. III. (now omitted). (U.S. IX. was 1 of oil of bitter almonds shaken in 1,000 of water and filtered.) *Average dose*, 1 drachm.

F. Norsk gives a "synthetic" Bitter Almond Water, viz.:—

Oil of Bitter Almond 4, Hydrocyanic Acid (2%) 50, Alcohol (90%) 146, Distilled Water 800. Contains 0·1% HCN.

Amygdalin is also contained in the bark of *Prunus serotina* (Virginian Prune or Wild Cherry bark), and the same action occurs when this drug is bruised with water.

Solubility.—Almond oil dissolves in all proportions in chloroform, about 1 in 2½ of ether and slightly in alcohol 90%.

Spiritus Amygdalæ Amaræ, U.S. IX. *Average dose.*—8 minims. Oil of Bitter Almond 1, Alcohol 80, Distilled Water to 100.

Amygdala Dulcis also yields about the same amount of Oleum Amygdalæ as Bitter Almond and contains Emulsin, but is free from Amygdalin.

Pulvis Amygdalæ Compositus (*B.P.* '14).—Sweet Almonds powdered (*s.a.*) 6, Refined Sugar 3, Powdered Gum Acacia 1.

Mistura Amygdalæ (*B.P.* '14) contains of this Powder 1, Water to 8, rubbed smooth and strained.

Emulsum Amygdalæ, U.S. IX. (not now in U.S.)—*Average dose* 4 ounces. Sweet Almonds 60, Acacia Powder 10, Sugar 30, Water *q.s.* to 1,000.

Sterilised Almond or **Olive Oil** or **Liquid Paraffin** intended for hypodermic injection, or lubricating catheters, is prepared by sterilising the oil in small flasks or bottles tightly plugged with cotton wool at 120°—140° C. for ½ hour.

Physicians and Surgeons should specify which oil is to be employed for 'Sterilised Oil.'

AMYL NITRIS (*B.P.* '14).

Amylis Nitris, U.S. X. and Ph. Ned. V., 80% pure, (**Amylium Nitrosum, P. Austr., P. Belg., P. Jap., P. Hung., P. Ital. IV., F.G. VI., P.Svec. X.**). $C_3H_{11}NO_2$=117·106.

Dose.—By inhalation, the vapour of 2 to 5 minims (**0·12 to 0·3 Cc.**) up to 10 minims—*Martindale.* By the mouth ½ to 1 minim (**0·03 to 0·06 Cc.**). Hypodermically, 1 to 5 minims (**0·06 to 0·3 Cc.**).

A yellowish ethereal liquid with a peculiar not disagreeable odour; produced by the action of nitrous acid on amylic alcohol boiling between 128 and 132° C. and consisting chiefly of iso-amyl nitrite. —Sp. Gr. 0·870 to 0·880; not less than 90% distils below 212° F. Amyl Nitrite is ***soluble*** in alcohol but insoluble in water. Should be kept cool: by exposure to the air it becomes comparatively inert.

For Assay see Vol. II.

Incompatible.—Alkaline Carbonates, Potassium Iodide, Bromides and Ferrous Salts.

Pharmacology.—Amyl nitrite dilates the vessels and lowers blood-pressure. In 30 to 40 seconds after inhaling or swallowing a dose it flushes the face, and increases the heat and perspiration of the head and neck.

The effect on the pulse can be shown within ten seconds of inhalation. This is due to the large area of the lungs absorbing the drug—roughly 100 sq. meters—and to the thinness of the membranes (about $\frac{1}{1000}$ m.m.) separating the air of the pulmonary vesicles from the blood.

The action of Amyl Nitrite and the Nitrites generally in relaxing arterial tension, was discovered experimentally by Rutherford and Gamgee. This led Sir Lauder Brunton to the discovery of its value and that of Nitroglycerin for relief of anginal spasm.

He first used Amyl Nitrite in angina pectoris in the winter of 1866–67. During an attack in this case the pulse became very quick and the pulse tension considerably raised. This rise of pressure he attributed to contraction of the arterioles. The success of the remedy proved the truth of the theory which led him to administer it.—L. ii./15,163. With the inhalation of Amyl Nitrite the vessels dilated and the pain passed off. It is now used for all varieties of cardiac pain, especially when it comes on in paroxysms.—H. W.

Amyl nitrite *cannot be deemed dangerous* in use in any way. Murrell writes—'A patient took a teaspoonful, vomited in a few minutes and seemed none the worse—another took 4 drachms and recovered—I know of no fatal case.'

Lowering of venous tension in each of 5 persons, preceded in one case by brief hypertension. Action of Trinitrin analogous in 7 cases, preceded by hypertension in three.—Comptes Rend., July 10, '25, per Jl. A.M.A. ii./25, 1259.

Uses.—It has been successful in relieving angina pectoris, sea-sickness, ague, spasmodic asthma, migraine, neuralgic dysmenorrhœa, post-partum hæmorrhage, tetanus, as an antidote to chloroform, to ward off epileptic attacks, and for the spasm of false croup and whooping-cough, and in cocaine and strychnine poisoning. It is largely employed in threatened fainting and collapse, and as a restorative after gas in dental extractions. It is valuable to restore animation in cases of apparent death, as from drowning.

Amyl Nitrite Sterules, *Martindale.*

Encased in cotton wool and Rayon; 1, 2, 3, 4, 5, 6, or 10 minims (0·06, 0·12, 0·2, 0·25, 0·3, 0·4 and 0·6 Cc.).

In use the sterule is broken, the liquid soaks the cotton wool and cover, and can be inhaled most conveniently. The 3-minim size meets most wants.

The contents of these sterules do not deteriorate on keeping. On the contrary, the contents of some 17 *years old were found to be fully active.*

FR. CX. has **Azotite d'Amyle.**—

'Preferably preserved in SEALED CAPSULES.'

U.S. and P. Jap. also direct to be kept in the same manner.

In ANGINA PECTORIS the best form for administration of Amyl Nitrite. Several may be used as there is practically no danger from its administration.—Whitla. In some cases more than average doses are needed to bring about fall of blood pressure.

Pseudo-angina occurring, as a rule, in the young, not serious with regard to patient's life, and is not relieved by the Nitrites—it requires tonic treatment and exercise; true angina requires the

Nitrites and Iodides. Brunton observed that rise in tension occurred along with angina and probably caused it.—B.M.J. ii./09, 1128.

CAUSATION OF ANGINA PECTORIS.—The exciting causes to angina pectoris are increased muscular effort and conditions which produce increased pressure in the peripheral arterial circulation—that is, conditions which throw an increased strain (either actual or relative) on the left ventricle.—Byrom Bramwell.

Clifford Allbutt lays down the rule that everyone of forty and over should at intervals of five years or so have his blood pressure measured in order that he may know in time if he be tending towards arterio-sclerosis. A man of, say 45, in whom a systolic pressure of some 160 m.m. of Mercury be found may seem well but has probably a slight increase in amount of urine, which will be too watery and may show a trace of albumin occasionally and probably now and then a few hyaline casts. Cut down animal proteids, give lacto-vegetarian diet, cut off excessive smoking and Alcohol, give a saline purge every morning with an occasional mercurial purge and the pressure will come down to normal or nearly so. If this is not sufficient Potassium Iodide will help. It probably helps in elimination. Not by any means a general rule, but occasionally high blood pressure may need use of vasodilators.

Vasodilators usually act even in profound cases of arterio-sclerosis, and Wallace and Ringer showed that their action is more prolonged here than in normal vessels. They may be placed in the following order as to speed of action and associated evanescence of effect :—
Amyl Nitrite, Nitroglycerin, Spirit of Nitrous Ether, Sodium Nitrite, Erythrol Nitrate, and lastly and more lasting Mannitol Nitrate.

In tobacco angina, useful.—Osler.

In chloroform syncope, Amyl Nitrite affords the quickest means of restoring the heart's action. The sterules are the most convenient form of using it.

Longevity —An early recognition of excessive tension is one of the important steps towards this (Hill and Barnard's and Oliver's Sphygmomanometers indicate the oscillations readily and are recommended). The systolic pressure is taken to be that which suffices to stop the pulse altogether, and the diastolic that at which the index gives the maximum oscillation. The normal systolic pressure is 100–120 m.m. for young adults, 115–135 or 140 for men in middle life and above 150 is abnormal. To lower pressure potassium iodide and cholagogues, &c., are used, but Amyl Nitrite and isobutyl nitrite have more rapid action than any other drug and are useful in cutting short paroxysms of pain. Nitro-glycerin can be given in divided doses during the day and keeps the tension low. Erythrol Nitrate has a still slower and more prolonged action.—Sir Lauder Brunton, L. ii./06,1335.

The nitrites have been used in many cases of aortic disease for a great length of time with marked relief of urgent symptoms and with no indication of prejudicial effects.

HÆMOPTYSIS arrested in every case in which Amyl Nitrite was tried, whether of mitral obstruction or from phthisis. Normally the effusion of blood irritates the lung tissue, causing coughing. The strain raises the blood pressure, inducing fresh bleeding. A vicious circle is in this way maintained till eventually the loss of blood becomes so great that the exertion of coughing no longer causes a marked rise of pressure, then the bleeding ceases. Amyl Nitrite accomplishes the same effect without further loss of blood.—Edin. Med. J. July, 1904 ; L. ii./04,522,942,1446 ; M.A. 1906,240 ; B.M.J.E. i./06,79. In severe hæmoptysis—rupture of an atheromatous pulmonary vessel—free use satisfactory.—B.M.J. i./06,917.

The general vasodilation produced is preferable to the vasoconstriction effected by Adrenalin internally.—L. ii./04,1446.

Hæmorrhage from bullet wounds in the chest, *e.g.*, in battle, can be controlled by inhalation of 5 minims.—L. ii./07,941.

In hæmoptysis amyl nitrite acts better the quicker it is used. In most cases it can be completely arrested if inhaled as soon as the first signs of blood show themselves in the sputum. If excitement afterwards of any kind, ¼ grain Morphine given. Amyl Nitrite, the drug *par excellence*, to be used first. Especially useful in sanatorium work where the patient is seen at the beginning of attack.

In pulmonary hæmorrhage resort at once to Amyl Nitrite after ¼ grain Morphine Tartrate hypodermically The cough slackens and hæmoptysis decreases.—J. W. Allan, Glas. Med. Jl. Nov., 1913.

In cerebral hæmorrhage Amyl Nitrite would appear to have advantage over venesection. It was found that in animals the drug stimulated the respiratory centre in addition to decreasing the blood pressure. It may be possible with this drug in man to cause a temporary fall of blood pressure without prejudicially affecting the respiratory centre as may occur with venesection.—Philip Hamill, Clin. Jnl., July, '14,430.

Post-partum hæmorrhage arrested.—B.M.J. ii./06,1125.

Invaluable but must be used with caution. During parturition Chloroform as is well known, is safe owing to the tension within the abdominal cavity, but it is dangerous given shortly after delivery, on account of the sudden withdrawal of this tension, which is liable to cause paralysis of the vasomotor mechanism, thus permitting the blood to accumulate in the splanchnic area. L. Hill has pointed out that Amyl Nitrite, if incautiously given, may produce the same effect.—A. T. Brand and J. R. Keith, "Clinical Memoranda for General Practitioners," 1923.

Can be used to control flooding at periods. By dilating the arterioles generally it diminishes the peripheral resistance; thus reduces general blood pressure, and thereby the vascular distension of the uterine mucosa. May prove of value in tiding over fibroid disease until the menopause, without necessity for major operation. *Obviously patients should be prevented from using to arrest normal flow.*

In tetanus, inhale at every spasm to gain time.—L. i./09,103.

Infantile convulsions are well treated by inhalation of 1 minim doses ; a whiff sometimes cuts the attack short.—Whitla.

A powerful agent to relax uterine spasms and hour-glass contraction, whether natural or caused by ergot.

Epilepsy well treated, controlling the fits and preventing insensibility.—B M.J. ii./89,599,688.

Asthma is relieved by Amyl Nitrite relaxing the peripheral vasoconstriction which is an essential factor in the bronchial vascular distension responsible for the obstruction in respiration.—L. i./07, 189. Pr., Oct. 1910, p. 529. Clin. Jl., Aug. 1909. After the relief the patient usually no longer suffers from cold hands and feet. Brilliant results follow the removal of polypi from the nose—this has a marked effect on blood pressure.—B.M.J.ii./11,1327.

In CROUP prompt in action.—Whitla, Pract. Med.

In HICCOUGH sometimes gives good results.—*ibid.*

In CARDIAC DISPLACEMENT. A case of severe attacks of dyspnœa which occurred every two days, a history of pleurisy. As a result of the adhesions, the heart was anchored much outside the usual position. Amyl Nitrite advised, which patient used (5 minims) during next attack, this so allowed the heart to act 'as it were being pulled right out' that it broke away from its false moorings. Patient able to bend with ease which was previously impossible. No further angina attacks which previously occurred every two days or so. Further treatment Strophanthus Tincture, which brought the heart back to normal position.—J. C. McNaughton, B.M.J. ii./12,181.

INTRATHORACIC ANEURYSM. For the acute anginal attacks—Amyl Nitrite inhalation followed by internal use of Nitroglycerin or Erythrol Nitrate ¼ or ½ grain is generally efficacious.—F. De Havilland Hall, L. i./13,948.

Fear of death entirely disappeared as patient knew he would get relief from Amyl Nitrite or Nitroglycerin. Angina much more common amongst the rich than the poor, associated as a rule with gout.—L. ii./09,572.

Hysterical APHONIA. Vasodilators (Amyl Nitrite and Nitroglycerin) used with success. A woman lost her voice for several days. After a few doses of Nitroglycerin 1/100 grain, aphonia disappeared and did not return. A girl of 18 had been aphonic for a year with varied treatment unsuccessfully. On inhaling a little Amyl Nitrite her voice instantly returned. Also used *per os* with Sodium Nitrite.—J. R. Keith, B.M.J. i./15,847.

PURULENT PERICARDITIS simulating angina pectoris. Patient when first seen was in an almost moribund condition. Pulse could not be felt; heart apparently beating feebly and irregularly at about 50. Strychnine and Camphor were injected with little improvement, but there was prompt response to *Amyl Nitrite.* At autopsy the pericardium was found to contain about 2 ounces of hæmorrhagic sero-purulent fluid. The man was probably killed by angina pectoris, but this condition was excited by the unrecognised pericarditis.—M. A. Cassidy, R. O. Moon and F. Le Q. Pelly, L. ii./21, 559.

ACUTE SUFFOCATIVE PULMONARY ŒDEMA. Patient, well-built, felt perfectly fit all day, but awoke suddenly at night with intense dyspnoea and feeling of impending death. Became cyanosed, orthopnœic and speechless. 1/100 grain Digitalin subcutaneously with improvement in pulse, but he complained of pressure in the head and giddiness. Amyl Nitrite inhaled with wonderful effect. Venesection employed, with instant relief. Blood pressure reduced.—F. Stuart Coleman, B.M.J., i./26,696.

SKIN AFFECTIONS: Eczema and other skin affections improved remarkably by inhalation, the arterial hyperæmia being the curative factor. Local treatment is also promising and brilliant results are stated to be obtained in urticaria and in senile pruritus.—Jl. A.M.A., i./25,1241, per P.J., i./25,546.

As a DIAGNOSTIC TEST OF MITRAL STENOSIS. Its action like that of exercise is to increase the flow of blood through the A—V ring which favours the production of the murmurs in question. Inhalation of 3 minims will often bring to light a clear presystolic or full diastolic murmur in a patient lying on his back, rendering early mitral stenosis diagnosable.—R. A. Morison, B.M.J. i./18,452. See also T. Fisher, *ibid.* 577.

Sterules, Hypodermic, contain 15 minims (1 Cc.). (Note the hypodermic *dose* is 1 to 5 minims.) Useful when inhalation is impracticable.

Amyl Nitrite in conjunction with **Pilocarpine Hair Lotion** (*q.v.*) has been used to increase the growth of the hair. Employ Amyl Nitrite 10% in Alcohol 90%. To be rubbed in the scalp on alternate nights.

ANTIMONIUM.

Sb=121·77.

Antidotes to Antimony Compounds.—Stomach tube (for Tartar Emetic, but not for Butter of Antimony), emetics, tannin or tea followed by stimulants.

Accidental poisoning by. A case recorded with recovery. Child was fed with milk and white of egg for the first 24 hours, afterwards barley water. A mixture of Compound Tincture of Cinchona and Tincture of Calumba was given.

Impalpable powdered antimony. Patent process described; suggested for injection.—P.J. i./11,293 (*vide* Ung. Antimonii).

Stibnite (Antimony ore) shipped from Alaska.—P.J. i./16,623.

P1 **Antimonii Arsenas.**

Dose.—$\frac{1}{100}$ to $\frac{1}{30}$ grain (**0·0006** to **0·002 Gm.**) twice or thrice daily. *Max. single dose.*—$\frac{1}{30}$ grain (**0·002 Gm.**); $\frac{1}{3}$ grain (**0·02 Gm.**) in 24 hours.—M. A.

A mixture of Antimonic Oxide and 20% Arsenic Acid; a heavy white powder. Used in syphilis and skin eruptions. Nervine and muscular tonic. Is a constituent in GÉLINEAU'S DRAGÉES.

Dose of these is one twice a day, increased to three, after meals.

For further details of their composition see Vol. II.

Antimonium Sulphuratum (*B.P.* '14). A mixture of the sulphides and oxides in orange red powder.

Uses.—Diaphoretic. In syphilis and skin affections.

Stibium Sulfuratum Rubrum, P. BELG. *Syn.* **Kermes Minerale** is made by boiling black Antimony Sulphide (Trisulphide) with Sodium Carbonate Solution, and allowing the liquor to cool.—FR. CX. similar. **Tabellæ**, P. BELG., contain 0·01 Gm.

Dose.—1 to 2 grains. ***Incompatible*** with sodium bicarbonate and potassium acid tartrate.

Antimonii Pentasulphidum. Pentasulfure d'Antimoine. Fr., Cx., Ph. Ned. V. Sb_2S_5=403·86.

Made by decomposing Schlippe's Salt with dilute Sulphuric Acid. **Antimonium Nigrum Purificatum.** *B.P.* '98. Sb_2S_3=339·732.

Greyish crystalline powder, decomposed by boiling hydrochloric acid. Used in veterinary practice as parasiticide.

Linctus Expectorans.

Dose.—½ to 1 drachm (**2 to 4 Cc.**). Sulfidi Stibici (Antimonii Sulphurati) 2, Syrupi 450, Aquæ Amygdalæ Amaræ 50. To be shaken before administering. Said to be of value for cough. Ph. Notes.—Denmark.

Antimony Crocus.—For veterinary use, is a mixture of Tri-oxide (about $\frac{4}{5}$) and Tri-sulphide ($\frac{1}{5}$) Formed by heating equal weights of Antimony Tri-sulphide and Potassium Nitrate to which $\frac{1}{12}$ of Hydrochloric Acid has been added.—U.S.D.

Antimonii Oxidum (Antimonious Oxide) Sb_2O_3=299·54.

Dose.—1 to 2 grains (**0·06 to 0·12 Gm.**).

A white powder, soluble in Hydrochloric Acid and in Alkaline Tartrate Solution, Caustic Potash, etc. Expectorant and emetic.

Injectio Antimonii Oxidi.—*Martindale.*

Dose.—15 to 30 minims (**1 to 2 Cc.**). *Subcutaneously, intramuscularly, or intravenously, increased as required.—Vide* Refs. *infra.*

These doses contain $\frac{1}{100}$ and $\frac{1}{50}$ grain respectively in a solvent of Glycerin and Water, equal parts. *Note.*—20 Cc. contain $\frac{1}{5}$ grain Antimony Oxide=½ grain nearly of Antimony Potassium Tartrate.

In making the injection the Antimony Oxide in fine powder, is carefully heated with the Glycerin, taking care to prevent the decomposition of the solvent, the water being added to the glycerin solution (warm). This produces a permanent preparation.

It is not possible to increase the strength of the Injection when a glycerin and water solvent is used: it is practically a saturated solution. For a stronger preparation a solution in 75% Glycerin, diluted at time of use, is suggested, *v. Injectio Antimonii Fortior.*

The preparation is apparently a chemical combination in the form of **Glyceryl Antimonite** (*cf.* G. T. Morgan, "Organic Compounds of Arsenic and Antimony," 1918, p. 295).

Uses.—It will be noted with regard to content of Antimony in the dose that the amount suggested has been on the side of caution, and though even with these small quantities the preparation has proved effectual in Leishmania infections, and trypanosomiasis, nevertheless stronger doses could no doubt be used in infections of the nature of bilharziasis. The literature, however, shows that the preparation in dose equivalent to even 1/20th grain Tartar Emetic, is active. This is of importance when treatment has to be extended over long periods.

In these Glycerin Injections the Antimony is in a labile condition and hence *reactive*—a body of the nature of **Glyceryl Antimonite** is more easily broken up than, for example, Antimony Potassium Tartrate or Antimony Sodium Tartrate where the component radicals are strongly linked together.

It would be of interest to try the preparations in syphilis and in malaria. See *Prevention of Malaria, postea.*

The following are abstracts from papers which have appe ared :—

TRYPANOSOMIASIS.—C. W. Daniels and H. B. Newham pointed out that successful treatment of these tropical protozoal infections (trypanosomiasis, etc.) entails keeping the disease under control possibly for two years. A case of Rhodesian trypanosomiasis was first treated with atoxyl subcutaneously and antiluetin *per os*. Trypanosomes were easily found in peripheral blood and varied from 1 or 2 to 20 per 200 leucocytes. Antimony Potassium Tartrate intravenously was given and for two or three days afterwards no trypanosomes were seen, but they recurred to the extent of 6 to 24 per 200 leucocytes on the third or fourth day.

Injectio Antimonii Oxidi in 2 Cc. doses was given (= 1/20 grain Tartar Emetic) daily subcutaneously and no trypanosomes were found for 6 days (2 per 200 leucocytes) and next day 3 per 200 leucocytes. On the following day 2 Cc. of the injection were given, and then twice a day for a fortnight, and no trypanosomes were found.

These subcutaneous injections are painless and can be repeated and cause no trouble, whilst intravenous injections are of the nature of an operation to the patient and continued intravenous injections are painful—extended use of the preparation is thought well worth while.—L. i./16,102.

'The preparation is good and practically painless' for this and in the treatment of kala-azar and oriental sore.—A. Castellani, B.M.J. ii./16,552 *et seq.*

Surg. Rear-Admiral Sir P. Bassett-Smith employed the injection in a case of trypanosomiasis. The dose employed to begin with was 4 Cc. (containing 1/25 grain of Oxide) increasing to 12 drachms (42·6 Cc.), (containing 2/5 grain); this was given as an intravenous injection once a week.

As this involved the injection of a considerable quantity of solution, a more concentrated preparation was employed, viz., 1 grain **(0·06 Gm.)** in 4 Cc. of pure glycerin. This was diluted by him four times, viz., to the proportion of 1 grain (**0·06 Gm.**) in 16 Cc. Of this 2·5 Cc. (= 1/6 grain Antimony Oxide approx.) were given *intramuscularly* without ill effect.

The object was to give the concentrated intramuscular dose alternately with the intravenous one—the latter has the highest sterilising effect on the blood, but it is not so lasting for killing off 'hidden away' trypanosomes.

Trypanosomiasis apparently cured after treatment with various arsenicals, Antimony Tartrate and Oxide.—G. C. Low and H. B. G. Newham, B.M.J. i./22,96.

Surg. Rear-Admiral Sir P. Bassett-Smith deals further with a trypanosomiasis case. Patient served in B.E.F. in Cameroons and was infected with *T. gambiense*. At one time he had 4,000 trypanosomes per c.mm. of blood. Under intravenous injection of Antimony Oxide the blood rapidly *cleared*, In May, 1917, he was again admitted for further course of Antimony as there was relapse, which rapidly cleared up. Each spring of 1918, 1919 and 1920, he had a course of 10 injections of Antimony Tartrate ½ to 2 grains. Patient now working. It was a severe *T. gambiense* infection cured by Antimony.—B.M.J. i./22,311.

In 'Medical Services of the War,' the Injectio Antimonii Oxidi received favourable mention for use in trypanosomiasis.

AMERICAN LEISHMANIASIS in S. America has in the past been treated by Antimony Potassium Tartrate intravenously. Injectio Antimonii Oxidi has proved promising; it may be subcutaneous, intramuscular or intravenous, the last mentioned being the most rapid. *From 1 to 2 Cc. on alternate days or from 5 to 6 Cc. of the solution weekly.* The former method (alternate days) appears to have a more lasting effect.

No local or general reactions were observed notwithstanding that the injections were made at the surgery, whence, after a quarter of an hour's rest, patients returned home. This procedure is not possible with Tartar Emetic. No bad effects are produced beyond a certain amount of pain which is transient.

Treatment may be supplemented by application of Tartar Emetic powder to wound. Cicatrisation of all lesions effected in one case by combining this local treatment with injections, and extensive ulceration of foot healed completely with injections and application of Zinc Oxide ointment.

In a further case of ulceration invading the whole nasal mucous membrane, the roof of the mouth and back of the palate, Antimony Oxide intramuscularly, intravenously and subcutaneously in doses of 1 to 2 Cc. caused cicatrisation and improvement after 3 months. Later, 6 Cc. intravenously on 2 occasions. No fever or local reaction. Eventual complete cure.

Has advantages over Tartar Emetic and has cured American leishmaniasis but unsuccessful in blastomycosis.—Esmundo Escomel, L. ii./17,355.

The following cases are also reported:—

(1) Leishmaniasis lesion on nasal septum and forearm cured by 1 to 2 Cc. injections until 30 Cc. reached and by local treatment with Tartar Emetic (saturated solution); (2) lesions of leg and entire mucous membrane of nose and mouth—apparent cure after 58 Cc. intravenously; (3) Ulcer on foot and much ulceration of mucous membrane of nose and mouth; apparent cure after 35 Cc. injected, but relapse later cured by further injections; total of 80 Cc. injected; (4) leishmaniasis of ear—15 Cc. intravenously (1 or 2 Cc. per injection) and 2 applications saturated solution Tartar Emetic effected cure.—E. Escomel, L. i./18,592.

Injectio Antimonii Oxidi Fortior—*Martindale.*

Suggested dose, to be used with extreme caution, 8 to 15 minims (**0·5 to 1 Cc.**) ***diluted*** with 2 or 3 vols. of water and injected immediately, subcutaneously or intramuscularly.—*See Animal Experiments, postea.*

A solution in 75% Glycerin of *strength* 0·5% w/v, i.e. 0·005 Gm. in 1 Cc. or 1/12th grain in 15 minims. 1 *Cc. is equivalent to* 0·012 *Gm.* (3/16 *grain approximately*) *Antimony Potassium Tartrate.*

In making the solution, slight heat is employed as mentioned in the previous preparation, neutralising any acidity by the addition of N/1 Sodium Hydroxide.

Chemical and Physiological Note.—The antimony is in a relatively loosely combined condition and hence *reactive.* On dilution with blood serum it is admitted a reduction takes place. Nascent Antimonious Oxide will be precipitated in a fine state of subdivision—ready for reaction with the infective parasites, the tissues and the body fluids. The essence of the injection is that it is a *solution* or chemical combination from which the Antimonious Oxide is precipitated in a nascent condition ready for immediate reaction with the parasitic infection, and it is conceivable that all antimonials suffer a breakdown to Antimonious Oxide before they are assimilated.

Uses.—This preparation may permit of the use of bolder doses of Antimony Oxide in Glycerin combination, on the lines of other treatment of trypanosomiasis and Bilharzia infection.

ANIMAL EXPERIMENTS (1924) indicated that this injection injected undiluted under the skin of the back of a cat left a very tender swelling and caused suppuration later. The preparation *must* certainly *be diluted* at the time of use in man. The ordinary Injectio Antimonii Oxidi is tolerated and useful, and it is probable that an intermediate strength, *e.g.* 0·25% in glycerin and water will be tolerated. Note that Bassett-Smith gave a 0·36% solution without ill effect.

Prevention of Malaria.

It is known that Quinine given to a patient just previously to his being bitten by infected mosquitoes is of no avail in preventing or delaying onset of the attack. It is possible that an Antimony injection of this type might be effective where Quinine fails, *cf.* p. 747.

P1 **Antimonium Tartaratum.** (*B.P.* '14.) *Syn.* TARTAR EMETIC. Antimony Potassium Tartrate. FR. CX. 'EMÉTIQUE.'

P1 *And all preparations or admixtures containing* 1 *or more per cent. of emetic tartar.*'

$[K(SbO)C_4H_4O_6]_2,H_2O$=667·813.

Dose.—Diaphoretic $\frac{1}{25}$ to $\frac{1}{8}$ grain, emetic $\frac{1}{2}$ to 1 grain. *Intravenously* $\frac{1}{2}$ to 2 grains (0·03 to 0·12 Gm.), usually in 1 or 2% dilution. *Hypodermically* it is painful and irritating.

FR. CX. has *max. single dose* 3 grains ; max. in 24 hours 9 grains.

A single dose over limit of safety, *i.e.*, between 0·01 and 0·02 Gm. per kilo body weight, is sufficient to cause death.—Fernand Michiels, per Jl. Trop. Med. Sept. 15/22,300.

Colourless crystals made by combining Antimonious Oxide with Acid Potassium Tartrate.

Soluble 1 in 17 of cold water. Almost insoluble in alcohol 90%. ***Incompatible*** with acids and alkalis, soap, and tannin.

Uses.—Diaphoretic and emetic.

In chorea in children this compound is less dangerous as emetic than apomorphine.

It is an active remedy in acute bronchitis often in combination with opium.

In SLEEPING SICKNESS, Tartar Emetic and **Antimonyl Sodium Tartrate** (*vide postea*) are given *intravenously*, as hypodermically they are too painful. The method alone (without Mercury or some other powerful adjuvant) is not effective, it drives the trypanosomes from the blood, but they still remain in the cerebro-spinal fluid.

Intravenously 1% solution in Normal Saline used in 2 to 10 Cc. doses daily for 5 to 10 days, then every other day or twice a week.

In espundia, granuloma inguinale, kala-azar and oriental sore, tartar emetic has powerful action. Efficacious also in yaws (with other drugs) and beneficial in relapsing fever.

SYPHILIS has been treated by Tartar Emetic intravenously. Improved certain cutaneous manifestations, but the compound had no specific action.

CHANCROID well treated by Tartar Emetic intravenously, 5 Cc. of a 1% solution every second day or at longer intervals; 4 to 6 injections increased by 1 Cc. to a total of 12 Cc.—H. Goodman, Jl. Urology, Apl. '25,489, per Pres., Feb. '26,75.

Castellani's Injection of Antimony Potassium Tartrate (*Intramuscular*).

Form No. 1.

Dose.—$\frac{1}{2}$ to 1 Cc. every other day in the gluteal regions.

Antimony Potassium Tartrate 8 grains, Carbolic Acid 10 minims, Glycerin 3 drachms, Water to 1 ounce.

Form No. 2 contains $\frac{1}{3}$ grain Sodium Bicarbonate in addition.

Both these produce some pain a few hours after administration.

Mistura Antimonii et Potassii Iodidi (*Castellani*).

Dose.—One ounce diluted with 3 or 4 times the quantity of water thrice daily, for adults; $\frac{1}{2}$ doses for children of 8–14 and for European patients.

Antimony Tartrate 1 grain, Potassium Iodide 1 drachm, Sodium Bicarbonate 15 grains, Sodium Salicylate 10 grains, Glycerin 2 drachms (or Syrup 1 drachm or Sodium Tartrate 10 grains). Water to 1 ounce.—A. Castellani, B.M.J. ii./16.552.

It is possible that on standing this mixture may deposit Antimonious Oxide, but a bottle of it which we prepared remained clear for a reasonable time. All the ingredients must be pure (the presence of Caustic Alkali will cause deposition) and each of the salts must be dissolved separately in a glass mortar *in as much water as possible before mixing.*

YAWS.—This mixture useful in conjunction with Novarsenobillon.—N. Cantlie, Jl. Trop. Med., Feb. 1/23,37.

References to use of Tartar Emetic.

Alarming results may follow Antimony Potassium Tartrate intravenously, due apparently to individual susceptibility or true anaphylaxis. Inter alia *the chief attack falls on the liver and kidneys. A variety of other Antimony Tartrate compounds are detailed with thei respective M.L.D. per kilo.—J. B. Christopherson and S. R. Gloyne. L. i./26,227,242. This statement is merely made as a warning. W have Dr. Christopherson's opinion, confirmed by countless observation in many parts of the world, that the regulation dosage as first laid dow in* 1919 (*and modified, as stated in our pages,* vide postea) *is a perfectl safe intravenous remedy for bilharziasis and very nearly a certai cure, but something must be left to skill in technique and judgment o suitability of cases.*

Bilharziasis successfully treated by Tartar Emetic intravenously. Fo children ¼ grain, for adults ½ grain ***A total of 30 grains or more is required, lasting over 15 to 30 days.*** The dose is dissolved i 20 minims of distilled water and this diluted with 2 volumes of distilled wate at time of use. It should be remembered that even small doses have bee known to cause death (½ grain in a child and 2 grains in an adult). Care an judgment are necessary.—J. B. Christopherson, L. ii./18,325. See als B.M.J. ii./18,652.

Bilharziasis, seventy cases, treated by Antimony Potassium Tartrate a Khartoum Civil Hospital. A very complete treatise on Bilharzia infection i general. The solution used is ½ grain in **10 Cc.** of water (a recent revision) It is thought to be the only drug with any direct effect on the disease. ***The dose, always dissolved in 10 Cc. of water (given ever other day) is increased by ½ grain every injection unti 2 or 2½ grains have been reached and this is maintained.*** (In the case of boys of 16 or under 1½ grains is th maximum). The total quantity injected would be 20 or 25 grain according to circumstances. If more than 25 grains is required, the surplu needed should be reserved for a second course. When the dose is 1½ or grains (sometimes before), a cough immediately on injecting indicates tha the Antimony is already in the pulmonary circulation and shows that the dru is both rapid and far reaching in its action. Two notable changes occu during the course of injections: disappearance of red blood from the urin but microscopic blood (smokiness) remains till later. The second chang (after about 20 grains have been given) is that the urine apparently becom clear and normal. These changes may coincide with the closing activiti of the worm. Daily estimations of the Antimony eliminated during a cour show that a third of the total amount of the Antimony given is eliminate The cumulative action of Antimony may have been over-estimated by the old writers. Bilharzia infection in Egypt on physique and character is disastrou the backward condition of the peasant (who constitutes 90% of the pop lation) is attributable to this scourge.—J. B. Christopherson and J. B. Newlov —Journal of Tropical Medicine and Hygiene, July 15th, 1919, pp. 129–144.

Not only is the parasite *Schistosoma Hæmatobium* killed *in situ* by th method but later the embryos in the ova deposited in the terminal vesse are killed and the patient therefore ceases to be a carrier

The Egyptian Fellaheen do not know they are infected. The parent worm often many hundreds, are situated in the portal vein and its tributaries. T ova working their way from the venule to the surface of the bladder a rectum in order to escape with the urine or fæces may take months to do s An ordinary uncomplicated case lasts 10 years or more. *S. Hæmatobiu* lives for that length of time or longer. Hitherto it has been thought th "no direct or other means is known by which the parasite can be destroyed

(Manson, Trop. Dis., 1918). Christopherson holds there *is* a cure. After about 12 grains have been given in as many days *some* of the ova are shrunken, shrivelled, blackish, etc., and they do not later hatch out in water. When this point is reached the parent worm is held to be killed in the portal circulation and the ova sterilised *in situ*. The patient ceases to be a carrier after about 20 grains. The Antimony Injections should only be given with greatest caution when any important organs—kidneys, liver, heart, lungs, etc.—are not sound.—J. B. Christopherson, L. i./19,1021.

Bilharzial infection treated by Tartar Emetic—supports Christopherson's findings.—A. Innes, B.M.J. ii./19,340. Up to 2 grains intravenously as dose—J. G. Cawston, *ibid.* 380; see also Christopherson, *ibid.* 494, and F. E. Taylor. L. ii./19,246; Christopherson, *ibid.*, 299.

1,000 cases of bilharziasis treated by Christopherson's method.—F. O. Lasbrey and R. B. Coleman, B.M.J. i./21,299. See also L. C. D. Hermitte, Jl. Trop. Med., April 15, 22,104.

Value in bilharzia, syphilis and leprosy.—F. Gordon-Cawston, M.P.C. Sept. 27/22,261. See also Pommé Jl. Trop. Med. Jan. 15/23,33.

Antimony Tartrate kills the ova deposited in the tissues by the worm, and afterwards kills the parasite, the former of course being the more important. **Contraindications**, when the disease is too far advanced, are serious cardiac and renal disease. (Per rectum in children, it is of doubtful value; probably even large doses not absorbed.) Initial dose is ½ grain (children under 10, ¼ grain) increased by ½ grain on alternate days, or thrice weekly until 2 or 2½ grains is reached, always using 10 Cc. of water.

'RHEUMATIC PAINS' liable to occur during the night following the 4th or 5th injection. There is increased hæmaturia as treatment proceeds; later, the blood and the ova vanish. Where there is **intolerance**, give brandy, ½ Cc. Adrenalin solution, and ½ Cc. 20% Post Pituitary Extract intramuscularly. In general, may be safely used. 10,000,000 infected Chinese on the Yangtse, and 6,000,000 people in Egypt.—J. B. Christopherson, L. i./24,1071.

The cure of Schistosomiasis by the intravenous injection of Antimony Tartrate.—J. B. Christopherson, I.M.G., Mar. '25,108.

Other drugs also kill the ova, but no drug deals with bilharziasis so completely because none has so great a parasitotropic action and so little organotropic in comparison. It kills the ova first, though W. H. Dye and M. Khalil have disputed it, and then the adult worm.—J. B. Christopherson, B.M.J., March 5, '27,418.

The treatment is now so popular that often Hindoos, both male and female, with their children, come long distances solely to be injected. Results intravenously absolutely favourable. The bilharzia (and filaria) carrier can always be cured; the bilharzia (and filaria) patient often not. The necessary dose varies widely for different individuals and question arises whether it is right to inject all patients with the dogmatic dose of 200 Cc. (30 grains). Experience from 3,000 injections.—P. H. J. Lampe, Jl. Trop. Med., Jan. 26,4—9.

About 11 million people affected with bilharziasis in India. Tartar Emetic intravenously for 12 days, starting with 0·03 Gm., then 0·06 Gm., then 0·1 Gm. daily to a total of 1·09 Gm., gives complete cure.—Jl. Intrav. Therap., Jan. '26,22.

A little boy of 4 years received a total of nearly 40 injections of Antimony Tartrate, which shows that this dose is good and non-toxic; as the hæmaturia recurred, decided to give gr. ⅓ on alternate days; but have recently given gr. ½, with the result that just one live egg could be found in the centrifugalised deposit; probably only two more injections will be needed. This makes a total of 6 grains in 49 days, and a little more five weeks later, which it was hoped would be final.—F. G. Cawston. Dec., 1926.

JAPANESE BILHARZIASIS treated by Antimony Tartrate intravenously.—J. B. Christopherson, B.M.J. ii./21,551.

Tartar Emetic advocated in Schistosomiasis Japonica in incipient cases and those in secondary stage but not in cases with advanced cirrhosis and ascites. Initial dose, 5 Cc. 1% solution intravenously, with total of about 2 Gm. over period of 60 days.—H. E. Mcleney, *et al.* Jl. Trop. Med., Apl. 15, '25,165.

Rectal use for bilharziasis. First dose 1 grain, then 2 grains every second day, increasing to 3, 4 and 5 grains during 3 weeks in 100 Cc. of water.

Less nausea and results equal to intravenous injections.—H. F. Wilson, B.M.J. i./22,137.

Bilharzia in 3 natives of Mongalla (C. Africa) completely cured by treatment with Antimony Tartrate.—N. Cantlie, Jl. Trop. Med., Feb. 1/23,40.

A large single dose per rectum is the only rational treatment. As much as 19 grains have been given (not for bilharzia). After 6 grains, in 4 ounces of warm water, ova disappeared in a case. Half an hour in the recumbent position afterwards is enough.—J. B. Anderson, B.M.J. ii./25,700.

Wilson showed that the rectum is tolerant of large doses of Antimony Tartrate (16 grains). Day, in Cairo, showed that 100% of the ova are killed by intravenous injection of 6 grains. The parent worm is 'upset' after 1½ grains, but more is needed to kill it.—J. B. Christopherson, B.M.J. ii./25, 867.

Further Notes on Treatment of Bilharziasis :—

The internal administration of the Liquid Extract of **Male Fern** 1 Gm. *t.d.*, "often acts like a charm" in controlling hæmorrhage.—Brooke. In the Zambesi district, the **Wortabel Treatment** with spirit of turpentine with thymol added.—L. ii./07,923. Avoid bathing too long in infected rivers and ponds. This is frequently a direct cause, the parasite entering through the urethra or anus. Bilharziasis is responsible in Egypt for most cases of moderate anæmia in children.—L. ii./11,1328. Bilharziasis and malignant disease of the bladder.—Jl. Path and Bact., July, 1911, p. 76.

Good results from **Thymo-benzene** (2 grains of Thymol in ½ drachm Benzene). Ova passed in shoals on the third day. The urine soon loses all colour of blood. Mild cases in robust subjects lose all trace of infection in a few weeks.—W. Robertson, L. i./16,698.

Emetine 3 grains given *intramuscularly* into the deltoid and lumbar regions every third day has been successful in bilharziasis: usually only 4 doses wanted. A child of 10 will stand 2½ grains.—B.M.J. i./21,586.

Account of personal experience of Bilharzia disease.—F. G. Cawston, Jl. Trop. Med., April 2/23,111.

The intermediate host of the worm is a fresh-water mollusc. The two main species in Egypt have distinct intermediate hosts. Effective means found for rendering infected water safe in military camps.—B.M.J. i./17,832.

A pamphlet (No. 339 Health), issued by J. Alexander Mitchell, the **Secretary for Public Health and Chief Health Officer, Pretoria,** Feb. '26, deals with varieties and distribution of types of bilharzial disease. Slow-flowing streams, pools and lagoons, in Cape Province, Natal, Transvaal, Portuguese E. Africa, Swaziland, and portions of S. Rhodesia, are looked upon with suspicion, as harbouring snails which may be infested with human red-water parasites. Useful precautions are given and a diagram poster showing the snail carrier of urinary and rectal bilharzia. Natural enemies of the snails are trout and duck. The life cycle of the parasite is shown on the diagram.

The presence or absence of bilharzia disease may be ***diagnosed*** by examining the blood serum on the lines of a Wasserman Test, the antigen used being made from the liver of snails infected with the cercariæ of *schistosoma hæmatobium*—Murray, S.A.Med. Rec. May, 1920, p. 168. See also Fairley, L. i./19,1016.

Cerebro-Spinal Fever benefited by ½ grain dose intravenously. A daily remitting temperature fell to normal in 60 hours and remained so.—S. Neave, L. i./16,1101.

Kala-azar well treated by Tartar Emetic injections intravenously. *Dose.*—Commence with 4 Cc. of 2% solution and gradually increase up to 10 Cc. Excellent results.—L. Rogers, L. ii./16,782. Except for melancholia and depression, no toxic effects.—H. I. Winifred Kerr, L. ii./18,45.

Kala-azar treated in like manner starting with ¼ grain and rising with two or three days' interval to 2½ grains. Total given 64¾ grains. The case died of influenzal pneumonia and examination of all the organs determined that complete sterilisation of the system had occurred so far as *L. Donovani* was concerned. Given in large doses over long period Antimony produces fatty changes in the liver and kidneys. The solution should not be too concentrated. Antimony Potassium Tartrate is evidently a specific against *L. Donovani.*—G. C. Low, B.M.J. i./19,702.

Compulsory treatment of kala-azar in Assam with Tartar Emetic intravenously 'has converted a disease with a 90% mortality into one with a 90% rate of cure.'—B.M.J. i./25,269.

YAWS. No amelioration after Antimony Potassium Tartrate intravenously in 1 grain doses for 8 to 10 days.—F. T. Auden, B.M.J. ii./22,83.

MALARIA is not combated by Tartar Emetic.—J. Pratt-Johnson and coworkers. B.M.J. i./21,80. It was originally suggested by Sir L. Rogers. Numerous refs. in 17th Edn. pp. 157, 158.

American Leishmaniasis of the skin treated by Antimony Potassium Tartrate beginning with ½ grain, increased to 1 grain—six injections during 14 days. Then a second course starting with 1 grain and gradually increased to 2½ grains.—22 injections in this second course spread over ten weeks—total 47 grains of Antimony. Each dose was dissolved in 2 ounces of normal saline and sterilised. Cure.—G. C. Low, B.M.J. i./19,479.

Leishmaniasis of the skin is curable by a few grains (5 to 8) of Antimony Sodium Tartrate intravenously. For bilharziasis 20 to 30 grains are necessary. 60 grains or more are needed for Leishmaniasis or kala-azar and possibly more still for trypanosomiasis.—J. B. Christopherson, L. i./21,522. See also H. B. Day, *ibid.* 525, 545, and Christopherson, B.M.J.E. ii./23,21.

Antimony causes cutaneous lesions of leishmaniasis to vanish, while Arsenic has no effect; it also heals syphilitic lesions due to Leucocytozoon syphilidis which are resistant to any other treatment. Tartar Emetic best administered *intravenously.*—J. E. R. McDonagh, Jl. Trop. Med., April 16/23,119.

Cutaneous leishmaniasis in Brazil. Two rare cases described. One cured by Tartar Emetic and the other well treated by Di-Sodo-Luargol.—De Aguiar Pupo, per Jl. Trop. Med., June 1/23,201.

Dermal leishmaniasis is a very widespread disease among the gum gatherers in Mexico, thought to be transmitted by a flying insect, which frequents the forests. Tartar Emetic intravenously recommended as the best form of treatment.—A. Inchaustegui, per Jl. Trop. Med., June 1/23,198.

Tartar Emetic is only slightly germicidal for leishmanias *in vitro*, a 1 in 100 solution being required to kill. Exact mode of action on parasites in human leishmaniasis has not been explained.—H. Noguchi, Int. Conf. Trop. Am., '24,468.

Salvarsan and Neosalvarsan showed native disinfecting power 10 times as great as Tartar Emetic: a 1 in 1,000 solution of Salvarsan killed leishmanias in saline solution.—H. Noguchi, Int. Conf. Trop. Am., '24,468.

KERATITIS well treated by Tartar Emetic intravenously.—F. G. Cawston, Jl. Trop. Med., May 15/22,127.

GRANULOMA INGUINALE—a disease endemic in Louisiana. Tartar Emetic intravenously specific.—I. M. Gage, per Jl. Trop. Med., June 15/23,222.

F. M. Johns is unable to substantiate claim that the organism of granuloma inguinale is probably identical with Donovan bodies, and concludes that it is a protozoan parasite. Tartar Emetic treatment 'strikingly specific,' but in view of possible damage to the liver the author suggests interrupted instead of continuous courses of treatment. Usual treatment 5—12 Cc. of a 1% Tartar Emetic solution intravenously at 2 or 3 day intervals.—Int. Conf. Trop. Am., '24,440—451.

TRICHINOSIS (one case) well treated with Tartar Emetic, 3 to 4 Cc. of a fresh 2% solution *strictly* intravenously for every 10 lbs. weight. Injections given every second or third day, and dose gradually increased but not beyond 10 Cc. for every 10 lbs. weight.—J. S. Grove, Jl. A.M.A. ii./25,350.

TUBERCULOUS HEMOPTYSIS arrested with Tartar Emetic by the mouth—a total daily dose of 0·05 to 0·15 Gm., usually for 5 days, in pills containing 0·02 to 0·05 Gm. with 0·01 Gm. of Opium, with water an hour before or after meals.—Presse Med., Oct. 14/25, per Jl. A.M.A. ii./25,1762. See also B.M.J.E. ii./25,76.

P1 Sterules of Antimony Potassium Tartrate, ½ grain (0·03 Gm.), 1 grain (0·06 Gm.), and 2 grains (0·12 Gm.) in 1·5 Cc. (25 minims), 3 Cc. (45 minims) and 6 Cc. (90 minims), i.e. 2% solutions, are made.

P1 **Solubes of Antimony Potassium Tartrate** contain 10 grains (0·6 Gm.) with Sodium Chloride 6 grains (0·4 Gm.), on the same lines as those of Antimony Sodium Tartrate, *q.v.*

Pulvis Antimonialis. (*B.P.* '14.) JAMES'S POWDER.

Dose.—3 to 6 grains (0·2 to 0·4 Gm.).

Contains 33⅓% Antimonious Oxide.

Ⓟ**Pilula Antimonii Conii et Quininæ.**

Dose.—As required in fever.

James's Powder 1 grain, Conium Extract 2 grains, Quinine Sulphate 2 grains. A pill on the lines of this formula had a reputation in Italy for treatment of malarial fevers. A most successful pill used in a variety of febrile conditions.

Haustus Emeticus Purgans, Mid. H., 1927.

Antimony Tartrate 1/6 grain, Magnesium Sulphate 60 grains, Water to 1 ounce for a dose.

Ⓟ **Vinum Antimoniale** (*B.P.* '14.).

Note.—Ⓟ *Preparations or admixtures containing Antimonial Wine.*

Dose.—10 to 30 minims (0·6 to 2 Cc.); as emetic 2 to 4 drachms (8 to 15 Cc.); contains 1 in 250 by volume.

F.I. (Second Int. Conf. 1925) is similar. Ph. Ned. V. has this.

Flavoring.—It has little taste when diluted.

Pneumonia is well treated by repeated 2½ minim doses of Antimonial Wine. Crisis comes at the end of the fourth day.

For further uses see Antimonium Tartaratum.

Antimonii et Sodii Tartras. **Antimonyl Sodium Tartrate.** $[Na(SbO)C_4H_4O_6]_2H_2O$=635·614. (*It is not a Poison within the meaning of the Act.*)

Dose.—*Per os,* presumably on the lines of Tartar Emetic.

Intravenously, ½ to 2 grains (0·03 to 0·12 Gm.) usually in 1 or 2% dilution.

Hypodermically it is not advised.

Manufacture.—Boil Antimonious Oxide 10 in a solution of Sodium Acid Tartrate 13 until almost clear (the quantity of Antimonious Oxide is purposely in slight excess). Filter and evaporate to dryness. When dried at 105° C. the substance retains ½ H_2O. Plimmer has shown that by adding alcohol to the concentrated solution the compound crystallises out with 2½ H_2O. There is no great advantage in this method. Furthermore, we have found that much of it remains in the mother liquor. The body is a white crystalline powder. ***Solubility*** 1 in 1½ of water.

Uses.—This compound has properties similar to Tartar Emetic, Its greater solubility may be of some advantage. It is stated to have the lowest degree of toxicity of the Antimonials for intravenous injection—Chopra and Napier, I. M. G. Jan. 1923. It has been largely employed in bilharzia infection, in which it is effectual. Kala-azar has been treated with it.

It has also been used in syphilis and in trypanosomiasis.

Sterules of Antimony Sodium Tartrate.—½ grain (0·03 Gm.) 1 grain (0·06 Gm.), and 2 grains (0·12 Gm.) in 1·5 Cc. (25 minims), 3 Cc. (45 minims) and 6 Cc. (90 minims) respectively, *i.e.* 2% solutions, are made.

Antimony Sodium Tartrate Solubes 10 grains (0·6 Gm.), combined with Sodium Chloride (0·4 Gm.). These, on dissolving in 40 Cc. of distilled water and boiling produce a solution ready for injection. 2 Cc. contain ½ grain (0·03 Gm.). They are convenient for carrying in the Tropics by medical men having occasion to give a number of injections.—J. B. Christopherson, L. i./24,1091.

Caution.—*One-third of the amount of Antimony injected is excreted by the kidneys in 24 hours. Great caution required where heart, kidney or lung disease exists. In weak, emaciated and anæmic subjects begin with small dose gradually increased.—R. N. Chopra, per Jl. Trop. Med., April* 16/23,133.

Bilharziasis.—For abstract of literature, see Tartar Emetic.

Kala-azar well treated with Antimonyl Sodium Tartrate intravenously. Begin with small dose, 0·5 Cc. of 2%, increasing by 0·5 Cc. up to a maximum of 5 Cc., and continue for 2 to 4 months as required. Heart, kidneys and lungs must function well.—R. N. Chopra and L. E. Napier, Ind. Med. Gaz., Jan. 1923, per B.M.J.E. i./23,45. Jl. Trop. Med. Mar. 1/22,64.

Oriental Sore. The best treatment is Sodium Antimony Tartrate, 5 to 10 Cc. of 1% solution daily, or less often, until healed. Vaccine and dressing with Salol in Olive Oil.—A. W. Sheen, Pr. Feb. 21, p. 85. See also J. B. Christopherson, Jl. Trop. Med. June 1/23,205. Oriental sore in Russian Turkestan—where it is very prevalent—successfully treated with 2% solution intravenously.—Maj. J. A. Sinton, per Jl. Trop. Med., June 1/23,200.

Filariasis is not cured by Antimony Tartrate intravenously.—G. C. Low, L. i./21,221. (Sir L. Rogers tried Antimony Sodium Tartrate.)

Leprosy. Beneficial results with Colloidal Antimony. Improvement also noted with intravenous injections of 2% solution of Tartar Emetic.—F. G. Cawston, per T. D. B., Vol. 17/21,284.

Antimony at best only an adjuvant in the treatment of leprosy. Ethyl Esters of Chaulmoogra and Hydrocarpus the treatment of choice.—Presse Med., Oct. 3/25, per Jl. A.M.A. ii./25,1676.

Granuloma Pudendi well treated with Tartrated Antimony. Salvarsan useless.—D. J. Maxwell, Jl. Trop. Med., July 2/23,235.

Leishmaniasis of the Skin is treated with this and Tartar Emetic *q.v.*

Syphilis treated with Antimony Sodium (and Potassium) Tartrate intravenously. Initial dose ½ grain, gradually increased to 1½ or 2 grains—given in 3 Cc. of water. Total dosage varied—in one case 23 grains. Results not inferior to those with Arsenic.—F. G. Cawston, B.M.J. i./22,266.

Tuberculous Disease of the lungs and of the eye treated. Tartar Emetic (intravenously) deserves further trial.—F. G. Cawston, B.M.J. i./24,820.

Trypanosomiasis.—In the experimental treatment in rats 0·5 Cc. of 1% solution per Gm. weight considered maximum dose. Its quickness of action is remarkable. A few very persistent forms can still be found in the liver. They need to be tired out by successive doses.—Plimmer and Thomson.

1 mgr. of Antimony destroyed the parasites in a 200 Gm. rat. Arsenic acted more slowly and in the case of Bismuth the damage done to the host was generally irreparable. *The trypanosomes, however, are not permanently destroyed—they return in course of time,* and ultimately antimony and arsenic-resistant trypanosomes are produced and retaining this property can be propagated from rat to rat—the arsenic resistant trypanosomes are still susceptible to Antimony and Bismuth. Suggestion to treat patients with all three drugs at once.—Cushny, L. i./09,239.

Antimony and Atoxyl showed promising results.—J. A. Clark, per T.D.B., Vol. 17/21,322.

In the human being intravenous injection of Antimony Sodium Tartrate 1/6 grain in Normal Saline has been reported effectual up to a point. 13 injections given with intervals of about 4 days or more. On the thirteenth injection, however, severe symptoms supervened,—chill and violent abdominal pain, and later intense headache, temperature 103·6,—this lasted 5 to 6 hours. The treatment, however, reduced the trypanosome fevers and apparently freed the peripheral blood from trypanosomes,—and no recurrence during 1½ years.—B.M.J. ii./11,104.

Some cases tend towards a natural recovery and appear to respond well to treatment, others get progressively worse in spite of remedies.—Wenyon.

Antimony Metal in fine division has been tried by intramuscular injection, but would not appear to have much scientific justification. Details in Edn. XVIII., p. 180.

Unguentum Antimonii. We have made this ointment containing 5% and upwards of finely powdered Metallic Antimony in a basis of Lanolin Ointment for use in skin affections.

***Stibenyl** (T.M. 406221). *Syn.* SODIUM ACETYL-*p*-AMINOPHENYL-STIBINATE.

Dose.—0·05 to 0·1 Gm. (¾ to 1½ grains) intravenously in 30 Cc. of Distilled water (?).

The compound—it is the antimony analogue of Sodium Acetyl-Arsanilate (Arsacetin)—occurs in brownish powder, easily soluble in water. A communication dealt with its use in trypanosomiasis and in kala-azar.—P. Manson-Bahr, L. ii./20,178.

Efficacy in trypanosomiasis and bilharziasis questioned.—B.M.J. i./21,650.

Should be used in smaller doses than originally advised, commencing with 0·05 and 0·1 Gm. intravenously.—P. Manson-Bahr, L. i./21,991.

Not successful in kala-azar—2 cases died in "disastrous" circumstances —L. E. Napier, L. i./23,280. A case cured. Doses varied from 0·05 to 0·2 Gm.—Monier-Vinard, J. Renault and G. Gendron, per Jl. Trop. Med., Aug. 1/23,257.

Urea Stibamine is a compound of Urea and *p*-amino-phenylstibinic acid $NH_2C_6H_4SbO.(OH)_2$.

KALA-AZAR. Safer than Tartar Emetic. An effective intravenous dose stated to be 0·25 Gm.—U. N. Brahmachari.—Ind. Jl. Med. Res., 1922, Y.B.P., '23,64. *See also* Jl. Trop. Med., July 15/24,203. I.M.G. '24,391 and 464.

Intravenous injections on alternate days, starting with 0·1 Gm. in cold sterile water, increasing by 0·05 Gm. to a maximum of 0·25 Gm. and continued for subsequent doses. Rapidity of disappearance of symptoms compared with Sodium Antimony Tartrate, 2 to 3 weeks as against 3 months.—H. E. Shortt and Ram Taran Sen, I.M.G. 1923,289; C.D., Feb. 23/24,259.

Some cases cured in 7 days—the average number of injections being from 7 to 10 as compared with 30 or more in the case of the Antimonyl Tartrates. Jaundice and albuminuria no contraindications, but best treated with small doses slowly increased. No signs of intolerance observed.—N. C. Kapur, I.M.G., May '25,210. *See also* Jl. A.M.A. ii./25,228.

The total amount required for treatment varies with age of patient from 2 to 6 Gm., the smaller doses being given to young patients.—Ind. Jl. Med. Res., per Jl. A.M.A. ii./25,228.

Reactions following administration of Urea-Stibamine and Stiburea.—L. E. Napier, I.M.G., Nov. '26,559. *See also* N. Chatterjee, I.M.G., June, '26,284.

U. N. Brahmachari alone entitled to use the name "Urea-Stibamine" for the purpose of manufacturing and selling Urea-para-amino-phenyl-stibinate.—I.M.G., June, '26,291.

'Aminostiburea' is said to be a compound of para-amino-phenyl-stibinic Acid with Urea and Glucose; contains 24·8% metallic Antimony. Toxicity in region of Stibamine and Urea-Stibamine. Initial dose for kala-azar 0·1 Gm., subsequent doses 0·2 Gm. Intravenous injections thrice weekly in 5% solution of sterile distilled water. Average number of injections 17, with average total dose of 3 Gm. Treatment lasts from 30 to 60 days. No untoward symptoms.—L. E. Napier, I.M.G., Dec. '25,571.

Stibamine Glucoside.—A compound containing 30% Antimony and allied to *p*-amino-phenyl-Stibinic Acid. It has a m.l.d. of about 500 mgm. per kilo, and is said to be better than Antimony Tartrates and to compare favourably with either 'Von Heyden 471' or 'Urea Stibamine.' Average duration of treatment about a month. Initial dose 0·1 Gm. of 4% solution intravenously, 0·2 Gm. the maximum for patients weighing over 50 lbs. Injections on alternate days.—L. Napier, I.M.G., Jan. '25,24.

***'Neostam'** (T.M. 464,641) A Brand of Stibamine Glucoside (**the nitrogen-glucoside of Sodium *p*-Aminophenylstibinate**), available in phials of 0·05, 0·1, 0·2, 0·5 and 1 Gm. for use in Kala-azar, etc.

Meta-chlor-para-acetyl-aminophenyl Stibinate of Sodium. *Syn.* *STIBOSAN (T.M. 458184) (Von Heyden '471').

This compound has low toxicity and high parasitotropic value.

0·2 to 0·3 Gm. in 5% solution intravenously on alternate days give better results than Antimony Tartrates.—L. Napier, I.M.G., '23,582.

Stibosan better than any other Antimony compound in kala-azar. Average number of injections to check fever three, and total number about 10; total amount of compound given between 2 and 3 Gm. Treatment lasts three to four weeks.—S. K. Das, I.M.G., Sept. '25,425; *see also* L. E. Napier, *ibid.*, Oct. '25,466.

A congenital case of kala-azar in infant born in England. Successfully treated with Stibosan intramuscularly.—G. C. Low and W. E. Cooke, L. ii./26,1209.

Sodium Antimony Thioglycocollate and **Antimony Thioglycocollamide** rapidly cured cases of granuloma inguinale; dose 0·1 Gm. intravenously every second day. No evidence of Antimony poisoning and no irritating effect at site of injection. Patients intolerant of Tartar Emetic were tolerant to the new drug. Both can also be used intramuscularly. Further investigation pending.—B.M.J.E. ii./24,91.

The pharmacological action of organic Antimony derivatives.—R. N Chopra, I.M.G., Apl. '26,162.

For further Organic Antimony Compounds, see Vol. II.

APIOL.

Dose.—3 to 6 minims (**0·2 to 0·4 Cc.**), in **Perles**, 3 minims in each, or **Capsules** 3, 5, and 10 minims.

A liquid preparation obtained from, and containing the active properties of, the fruit of *Carum Petroselinum*. *Syn.* *Apium Petroselinum*, *Petroselinum sativum*, common parsley. It is a green oily liquid, with a peculiar odour and a pungent taste like parsley. Soluble readily in alcohol and ether.

Apiolin is the name given to the product obtained by separating the last traces of fats and wax.—Finnemore.

Apiol has decided efficacy in primary amenorrhœa or deficiency of secretion, as well as in accidental suppression and in dysmenorrhœa. Should be given night and morning for 4 or 5 days during the time.

Parsley contains no alkaloid; *cf.* *Æthusa Cynapium*.

Apiol, Crystallised. **'White Apiol.'** ÉTHER MÉTHYLÉNIQUE ET DIMÉTHYLIQUE DE L'ALLYL-APIONOL. CAMPHRE DE PERSIL. (Was in Fr. Cx. Now removed by Fr. Cx. Supp. 1920.)

$$CH_2 : O_2 : C_6H(OCH_3)_2CH_2.CH. : CH_2 = 222{\cdot}112.$$

In acicular crystals. For amenorrhœa a sterilised solution in olive oil containing 3 grains (**0·2 Gm.**) in 15 minims (**1 Cc.**) has been given—injected once daily for some days before the period. Also given as a quinine substitute in malaria.

P1 **Capsules of Apiol and Ergotin.**
Contain Apiol 5 minims (**0·3 Cc.**) and Ergotin 2 grains (**0·12 Gm.**).

P1 **Ergoapiol.** Under this name capsules are supplied for amenorrhœa, dysmenorrhœa and allied disorders.

Gall Stones treated by infusion of parsley—a double handful of fresh parsley leaves soaked in cold water, which was afterwards brought to the boil, strained and allowed to cool. *Dose*: 1½ pints daily. Obviated operation for years.—H. C. Kidd, B.M.J. ii./20,244.

Apium graveolens. (*Umbelliferæ*) ACHE DES MARAIS.—FR. CX. Celery. The entire herb is used in 'SIROP DES CINQ RACINES.'

Oil of Celery. *Dose.*—½ to 3 minims or more. Capsules are made 3½ and 5 minims. Contains a small proportion of Apiol. Antispasmodic and nerve stimulant.

In rheumatoid arthritis 5 to 15 minim doses have been used successfully. It acts probably as an intestinal antiseptic.

APOCYNUM.

American Indian Hemp Root. U.S. VIII. *Syn.* APOCYNUM CANNABINUM. CANADIAN HEMP.

Average dose (of root in powder) 15 grains (**1 Gm.**).

Does not contain Alkaloid and is not in Poisons Schedule, but caution : a powerful drug.

Pharmacology.

The tincture (10%) is about 1½ times more toxic than Tinctures of Digitalis and Squill, and nearly six times less toxic than the Tincture of Strophanthus (*i.e.* the *B.P.* '98 Tincture which was ¼ as strong as the *B.P.* '14). Produces its diuretic effect best on patients with cardiac disease and a failing heart. Ranks next to Strophanthus as regards toxicity to frog's heart and it is more toxic than digitalis and squill. No special difference in action on the kidneys, but apocynum is most likely to produce hæmaturia owing to its irritant properties.—L. i./10,81.

Uses.—Stated to be a rapid and efficient cardiac stimulant, also an active diuretic occupying a place between Digitalis and Caffeine, non-cumulative. A powerful emetic, diaphoretic, cathartic, and anthelmintic, and diuretic, employed in cardiac dropsy and Bright's disease. The active principle is said to be a crystalline non-glucosidal substance called variously **Cynotoxin** and **Apocynamarin.**

Tinctura Apocyni. 1 in 10 of Alcohol 60%.

Dose.—5 to 60 minims (**0·3 to 4 Cc.**).

Uræmia is warded off by the profuse diuresis it produces and it is valuable in removing pleuritic effusion. **Decoctum** 1 in 60. *Dose.*—½ to 1 ounce.

Fluidextractum Apocyni, U.S. VIII.

Average dose.—15 minims (1 Cc.). 1=1 glycero-hydro-alcoholic. Useful in dilatation of heart, mitral, and other valvular lesions.

P1 APOMORPHINÆ HYDROCHLORIDUM.

P1 *Apomorphine and its Salts.*

P1 **Apomorphine Hydrochloride** (*B.P.* '14). U.S. X., P. HELV., P. JAP., P.G. VI., PH. NED. V. Chloretum Apomorphicum, P. DAN.

For details of the Chemical Formula of this body, see Vol. II.

Dose.—$\frac{1}{32}$ to $\frac{1}{16}$ grain (**0·002 to 0·004 Gm.**), increased, as an expectorant (not official); $\frac{1}{10}$ to ¼ grain (**0·006 to 0·016 Gm.**) as an *emetic per os*; $\frac{1}{20}$ to $\frac{1}{10}$ grain (**0·003** to **0·006 Gm.**) as *emetic hypodermically.*

A derivative of morphine or codeine obtained by heating them with an excess of hydrochloric acid in sealed tubes. Apomorphine is morphine deprived of a molecule of water. In commerce the hydrochloride occurs in minute pale greyish white, acicular crystals

Soluble.—1 in 60 of water, 1 in 5 of alcohol 90 %; the solution turns emerald-green in colour, but some state that this causes little loss of medicinal power. This discoloration is said to be due to the action of free ammonia in the air. For method of making colourless injection *vide infra.* Insoluble in ether and chloroform.

Incompatible with sodium carbonate and bicarbonate, tannin and iron salts.

***Uses.**—In all cases of poisoning it is of great value as an emetic.* It is an anti-stimulant; in bronchial asthma doses of $\frac{1}{6}$ grain are very useful. Small doses are expectorant and relieve bronchitis and pertussis.

In puerperal convulsions it soon causes vomiting and free perspiration, patient sleeps and awakes quiet.

In a case of obstruction of the œsophagus by a plumstone, the injection of Apomorphine hypodermically caused vomiting and its removal.

As an expectorant $\frac{1}{20}$ grain every 2 hours is useful, or, given with the same quantity of morphine every 2 or 4 hours, it lessens cough and increases fluidity of sputa.

Ⓟ**Tabellæ Apomorphinæ,** $\frac{1}{100}$ grain (**0·0006 Gm.**) and $\frac{1}{50}$ grain (**0·0013 Gm.**) in each, with chocolate, also Ⓟ**Tablets Compressed.**

Ⓟ**Injectio Apomorphinæ Hypodermica.** (*B.P.* '14).

Apomorphine Hydrochloride 1, Diluted Hydrochloric Acid 1, Distilled Water to 100. $\frac{1}{10}$ grain in 11 minims.

Dose.—5 to 10 minims (or more) as an emetic. The addition of the trace of acid keeps it stable and colourless.

The following will also remain colourless:—Shake Apomorphine Hydrochloride 1, with Alcohol 90% 50; add Water 140 and finally Diluted Hydrochloric Acid 10.—Pharm. Zeitung 61,640. We found the formula satisfactory.

The effect produced by a small injection on a mad-drunk patient is remarkable. As hypnotic $\frac{1}{40}$ to $\frac{1}{20}$ grain. The patient, however wild, sleeps 12 hours and awakes refreshed.—B.M.J. ii./13,663.

Ⓟ**Hypodermic Tablets** are prepared containing $\frac{1}{20}$, $\frac{1}{15}$ and $\frac{1}{10}$ grain in each. Ⓟ **'Sterules' Hypodermic** contain $\frac{1}{10}$ grain.

Ⓟ**Syrupus Apomorphinæ (Hydrochloridi), B.P.C.**

Apomorphine Hydrochloride 0·05, Diluted Hydrochloric Acid 0·25, Alcohol (90%) 4·5, Distilled Water 4·5, Syrup to 100.

Dose.—$\frac{1}{2}$ to 1 drachm (**2 to 4 Cc.**), contains $\frac{1}{36}$ grain Apomorphine Hydrochloride in 1 drachm.

Ⓟ**Linctus Apomorphinæ cum Codeina.** (Adopted by St. G. H.) *Dose.*—1 drachm (4 Cc.).

Apomorphine $\frac{1}{50}$ grain, Codeine Phosphate $\frac{1}{12}$ grain, Dilute Hydrocyanic Acid 2 minims, Syrup of Virginian Prune 1 drachm.

A useful expectorant.

Ⓟ**Mistura Apomorphinæ Composita,** (*Syn.* **Mistura Tussis,** *Luff.*) *Dose.*—Half ounce every four hours.

Apomorphine Hydrochloride 1/48 grain, Morphine Hydrochloride 1/24 grain, Heroin Hydrochloride 1/24 grain, Dilute Hydrochloric Acid 5 minims, Syrup of Virginian Prune ½ drachm, Chloroform Water to ½ ounce.

A palatable mixture useful for irritable cough, especially post-influenzal cough. The hydrochloric acid effectually prevents the precipitation of any of the alkaloids.

AQUÆ CONCENTRATÆ.

These are made commercially about 40 times as strong as the distilled Aromatic Waters by dissolving the requisite amount of Essential Oils in Spirit of 70% strength (by volume). They are diluted 1 up to 40 at the time of use and have the advantage of keeping good any length of time in any climate. The following is a list, giving the proportions of Essential Oil (or ingredient stated) to prepare 100 parts of concentrated water :—

Aqua	Amygdalæ Amaræ Conc. U.S. IX.	4·0	(use Essential Oil *with* HCN)
,,	Anethi Concentrata	8·0	
,,	Anisi Concentrata	8·0	
,,	Aurantii Floris Concentrata	8·0	
,,	Camphoræ Concentrata	4·0	(Camphor)
,,	Carui Concentrata	8·0	
,,	Cassiæ Concentrata	8·0	
,,	Chloroformi Concentrata	10·0	
,,	Cinnamoni Concentrata	8·0	
,,	Foeniculi Concentrata	8·0	
,,	Menthæ Piperitæ Concentrata	8·0	
,,	Menthæ Viridis Concentrata	8·0	
,,	Pimentæ Concentrata	5·0	
,,	Rosæ Concentrata	1 to 2	
,,	Sambuci Concentrata	1·0	

These strengths have been calculated in some instances from the average yield of oils from the drugs in question, and in others from the strengths of the extemporaneous Aromatic Waters (*B.P.* '14), allowed for use in the Colonies, qualified by the fact that the general solubility of Essential Oils in water is about 1 in 500. The solubility would not be materially greater in the weak spirit of the finished product. We have prepared all from the above formulæ and find same satisfactory. Terpeneless and Sesquiterpeneless Oils may be used as being more soluble.

ARGENTUM.

Ag=107·88.

Argenti Acetas. $CH_3COO\,Ag$=166·904.

In white crystals, ***soluble*** in water. A 1% solution for purulent ophthalmia in infants. Dilute Sodium Chloride Lotion may be used after it.

Ophthalmia Neonatorum is prevented by Silver Acetate as well as by the Nitrate; causes less catarrh.—B.M.J.E. i./26,39.

ℙ1 Argenti Cyanidum. $AgCN$=133·89.

Dose.—$\frac{1}{64}$ to $\frac{1}{20}$ grain (**0·001 to 0·003 Gm.**).

White powder containing 80·48% Ag. Antipyretic occasionally used in epilepsy and chorea.

ℙ1 Pilula Argenti Cyanidi contains $\frac{1}{60}$ grain.

Argenti Chloridum. $AgCl$ = 143·337.

Varicose Ulcers.—Silver Chloride suspension made in the presence of a protective found to be useful, employing 1 to 10% dilutions. 4% usually employed.—B.M.J.E. ii./26,44.

Argenti Iodidum Recens. $Ag\,I$=234·812.

In the freshly precipitated form this salt has been used in cases of ophthalmia. It has useful astringent properties stated to be almost as good as adrenalin.

Also advocated in emulsion for use in urethritis and other similar conditions. The nascent silver iodide in 3% suspension may be produced from silver nitrate 2·2 Gm., potassium iodide 2·2 Gm., distilled water 50 Cc., mucilage of Irish moss N.F. to 100 Cc. The degree of fineness of the precipitate is photographically of importance, so also by analogy therapeutically To produce a coarse precipitate the salts are separately dissolved in 5 Cc. of the water, shaken and diluted with the mucilage. For a light flocculent precipitate dissolve each in 50 Cc of water. Gelatin 0·3% has also been used to dissolve the Potassium Iodide.

For the cure of corneal opacities and conjunctivitis, this suspension, commencing with 1% strength is most serviceable, also satisfactory in treatment of pannus. In ulcer of the cornea it should be used cautiously. For gonorrhœal ophthalmia most efficacious. One drop of weak solution instilled three times a day or oftener in cases of extensive chemosis and danger of corneal sloughing, alters the condition in a few days.—P. Moloney.

Neo-protosil.—A colloidal protein-Silver Iodide compound, containing about 20% of Silver Iodide in cream coloured scales, readily soluble in water, but when making a solution the container should be briskly shaken for a minute to prevent scales adhering together. The solution is bland and equal in bactericidal effect to Colloidal Silver Solution and non-staining. Used in urethritis, inflamed conditions of the eye, ear, nose and bladder, etc.—L. ii./22,298.

Neoprotosil Capsules.—One dissolved in 2 drachms of water forms a 5% solution.

Argentide. A concentrated Solution of Silver Iodide, containing 100 grains in each ounce. A small quantity added to water causes a precipitation of pure silver iodide in fine suspension for antiseptic treatment of cystitis, gonorrhœa and conjunctivitis.

Argenti et Potassii Iodidum. *Syn.* **Silver Potassium Iodide.** $KAgI_2$.=400·84.

The double Iodide of Potassium and Silver (Mellor's Inorg. and Theor. Chem.). A crystalline substance readily soluble in water. Silver Iodide is precipitated on dilution but precipitation is not complete until a fairly high dilution is reached.

Preparation of an Injection.—One part by weight of crystallised Silver Potassium Iodide and 4 parts Potassium Iodide are intimately mixed and dissolved in water, as required, in strengths of 0·5 Gm., 1 Gm., and 1·5 Gm., in 20 Cc. in each case. Each of the dilutions contains a fine suspension of Silver Iodide and a solution of the double salt.

Uses.—In gonorrhœa the injection of 20 Cc. into the meatus (apply tight bandage over glans for 15—30 minutes after injection), causes a rapid decrease of discharge after 6 injections and a complete disappearance of gonococci after 12 to 15 injections. Injections need only be given twice or thrice weekly, as Silver Iodide persists in the urethra.—S. R. Naidu, B.M.J. i./27,139.

Argenti Nitras. $AgNO_3$=169·88. *Syn.* LUNAR CAUSTIC.

Dose.—¼ to ½ grain (**0·016 to 0·03 Gm.**) in a pill, best with kaolin ointment as an excipient.

Incompatible with organic material, *e.g.*, rose water, if used instead of distilled water for preparing a lotion of pigment; also with Tartaric Acid, Hydrocyanic Acid, Iodine, Iodides and Bromides.

Soluble 1 in 0·53 of water and 1 in 20 of alcohol 90%.

Dangerous Mixtures are produced in certain conditions—*e.g.*, when a small quantity of powdered Silver Nitrate, *e.g.*, 2 to 3 Gm. is mixed with an equal quantity of powdered Magnesium and then a drop of water added, a slight explosion with vivid flash occurs.—Na. Nov. 9/11,42.

Uses.—Much employed as a caustic and stimulant to promote healing. Small doses internally check diarrhœa of children. In typhoid has been used where there is hæmorrhage ⅙ grain every 3, 4 or 6 hours, or even as often as every 2 hours. Rectal injections are also useful for the bleeding of dysentery (60 grains in 3 pints). In laryngeal phthisis a spray ¼ to 2 grains to the ounce.

In vomiting of pregnancy ⅙ grain in a wine-glass of water every 6 hours has been found effective. In gastric ulcer ⅓ grain in a pill 3 or 4 times daily half an hour before food useful. Solutions have also been used. In eczema of the flexures and particularly of mucous surfaces, Solution 2 to 3%, alternating with Lotio Calaminæ Oleosa is valuable. Pigments, 2 to 5% are used for the throat, and applied to ulcers as a stimulant. Lotions and eye-drops vary from 1 in 1,000 to 1 in 100. Purulent ophthalmia is treated with 1 to 2% drops. Ulcerative stomatitis is well treated by 0·5 to 2% Solution.

Glycerin 15% added to ½ to 2% silver nitrate solution renders it less painful, and possibly more effective.

Silver Nitrate is on the alert to react (*e.g.*, precipitate with soluble chloride) in such manner that its electrical state and stability of its ions are altered—herein lies its nature.—Burdon Cooper.

War wounds have been treated by spraying with very dilute Solutions—see **Wounds**, Therap. Index.

Urethral and Vaginal Injections 0·02 to 0·2% (1 in 5,000 to 1 in 500) usually employed.

In lavage of the entire urethra 2 grains to the pint (1 in 5,000 approx.) is sufficiently strong. Hydrostatic pressure may be used, *i.e.*, the container being about 5 feet above the couch, instead of a syringe.

Silver Nitrate has more penetrating effect than any organic Silver compound and should be adhered to as a standard remedy for injection treatment of gonorrhœa.—Brit. Jl. Ven. Dis., Oct. '25,245, per Pres., Feb. '26,78.

CYSTITIS: Diagnosis and treatment. Against Urotropine there are innumerable failures. Ideal urinary antiseptic not found. With regard to lavage, Silver Nitrate best. A weak solution, 1 in 20,000 first, gradually increased. Eusol as accessory to supra-pubic drainage; rarely with catheter—too painful. Vaccines useless.—J. F. Dobson, B.M.J. ii./21,305.

EPITHELIAL TUMOURS OF THE URINARY BLADDER. The old-fashioned Silver Nitrate washes still hold the field. A patient had the bladder washed out over 2,000 times. Diathermy more rapid.—F. Kidd, L. i./23,582.

WHOOPING COUGH treated by painting the throat every two days with 2% Silver Nitrate Solution—success attributed to suggestion rather than bactericidal action.—L. i./21,1312.

CREEPING DISEASE (PSEUDO-MYIASIS), a suspected case of, successfully treated with Nitrate of Silver.—A. Gambier, per Jl. Trop. Med., April 16/23, 133.

Antidote to Silver Nitrate.—Common salt, given in some demulcent drink (excess should be avoided as it is very irritant to the stomach). Salt is also used to arrest its action locally as a caustic. The pain caused by application of solutions of silver nitrate may be alleviated by previous application of a solution of cocaine nitrate.

Argyria produced. Inside of nose repeatedly painted for 18 months, and after an interval of a year nose and throat painted practically daily. Prolonged use dangerous.—per Clin. Jl. Jan. 3/23,6.

Stains caused by Silver Nitrate are best removed by Potassium Cyanide.

Liquor Argenti Nitratis, R.O.H.—1 or 2%.

In ulcerative blepharitis 1 or 2% solution a sovereign remedy; Protargol 10% or Argyrol 20% may be employed.—R. A. Greeves, L.ii./23,997.

Urethral Bougies of Silver Nitrate contain ½ grain with Theobroma basis. Give good results in obstinate cases of gonorrhœa.

Argenti Nitras Fusus. U.S. Contains 94·5% of Silver Nitrate. Silver Nitrate 100 Gm., Hydrochloric Acid 4 Gm. Melt at low temperature and pour into suitable moulds.

Argenti Nitras Mitigatus (*B.P.* '14). *Syn.* MITIGATED CAUSTIC.

Silver Nitrate 1, Potassium Nitrate 2, fused together and moulded into sticks for use as caustic.—P. Jap. uses equal parts.

Argenti Nitras Induratus, Toughened Caustic (*B.P.* '14). Contains 5% of potassium nitrate moulded into caustic points.

For the use of Silver Nitrate in preparation of Hair Dyes, see Vol. II.

Ophthalmic Lamels of Silver Nitrate contain $\frac{1}{500}$ grain in each combined with gelatin.

Pigmentum Argenti Nitratis Æthereum, L.H.

Silver Nitrate 10 grains, Distilled Water 1 drachm, Spirit of Nitrous Ether to 1 ounce. Caustic even when painted on a greasy skin. 3 to 10 grains to the ounce relieves pruritus ani and pruritus vulvæ.

D P 1 **Pilula Argenti Nitratis et Morphinæ Acetatis, Crocq's Pill,** contains ⅙ grain of each salt made with Kaolin Ointment.

Unguentum Argenti Nitratis Compositum. *Syn.* UNGUENTUM BILLROTHI, Ph. Ned. V.

Silver Nitrate 1, Peru Balsam 5, Yellow Soft Paraffin 94.

Pigmentum Delineans K.C.H.

No. 1, Silver Nitrate 5 grains, Water 1 ounce. No. 2, Pyrogallol 10 grains, Water 1 ounce. The solutions are used in conjunction.

Argenti Oxidum. B P. '98. $Ag_2O=231{\cdot}76$.

Dose.—½ to 2 grains in a pill with kaolin ointment.

Is not so caustic in action as silver nitrate. Continued administration may discolour the skin. It readily yields its oxygen, and will explode (if mixed) with such bodies as phenol and creosote.

Uses.—Has been given in epilepsy, chorea, and dysentery It stains the skin less than the nitrate.

Argenti Fluoridum (soluble 1 in 2), **Argenti Citras** (hardly soluble), and **Argenti Lactas**, are occasionally used by urethral injection, strength 1 in 5,000 upwards, in gonorrhœa.

Argyrol.—*Syn.* VITELLIN.

A vegetable protein compound containing about 30% of silver.

Soluble in water in all proportions—solutions keep well. ***Incompatible*** with Cocaine Hydrochloride and other alkaloids. In purulent conjunctivitis (gonorrhœal, neonatorum, etc.), free instillation of 25% solution every 3 or 4 hours; catarrhal conjunctivitis, 5 to 20% one or more times daily; trachoma, 25% solution rubbed with force on wool into lids once daily; dacryocystitis, corneal ulcers, etc., 25% solution.

Numerous critical views as to its efficacy have been published.

Ulcerative colitis has been treated by washing out with 1½ pints of 1% Argyrol solution at 80° F.

Unguentum Argyrol 2% with paraffin basis in eczematous conjunctivitis and keratitis. **R.O.H.** has 20%.

Suppositories containing 1 to 4 grains have been used.

Argento-Proteinum Mite. *Syn.* MILD SILVER PROTEIN, MILD PROTARGIN, U.S. X.

Contains not less than 19% or more than 25% Silver. It is in dark brown or almost black shining scales or granules. It is therefore of the Argyrol type (*cf.* N.N.R., 1925).

✱**Collargolum** (T.M. 219555), **Colloid Silver.**—*Syn.* ARGENTUM COLLOIDALE, P. Jap. IV., ARGENTUM CRÉDÉ.

Dose.—½ to 2 grains (**0·03** to **0·12 Gm.**) in pills or solution.

ARGENT COLLOIDAL (COLLARGOL). FR. CX. Nouv. Supp. '26 (and P.G. VI.). Contains at least 70% Silver in combination with albuminoid substances. Soluble slowly 1 in 25 in cold water. The precipitate obtained on adding saturated solution of Sodium Chloride re-dissolves on further addition of water.

P.G. VI. says, on adding dilute mineral acids to aqueous solution, a precipitate forms which redissolves on neutralising with alkalis. Ph. Ned. V. requires 74·5 to 80% Silver. P. Svec. X. 72 to 80%.

Collargol Tablets contain ¾ grain (**0·05 Gm.**).

Black scales, miscible in all proportions with water, but does not form a clear solution even when dilute.

Internally has been used for gastric and intestinal catarrh; also *intravenous* injections of a ½ to 1% solution for septic affections such as endocarditis, also in difficult labours where septic complications feared. 0·1 to 0·15 Gm. in 1% solution as a dose.

For ophthalmic use 1 to 10% solutions are employed.

Diphtheritic membrane is said to disappear under swabbing with 5% solution.

Subacute bacterial endocarditis. Intravenous injections of Collargol and other metallic and antiseptic substances tried—no success.—B. Parsons-Smith, B.M.J. i./21,43.

B. Coli and other infections of the urinary tract satisfactorily treated with Collargol in various strengths (0·5 to 4%).—H. H. Sanguinetti, B.M.J. i./25,1168.

Suppositories of Collargol 2½ grains, also Ⓟ**Compound Collargol Suppository**, Collargol 2½, Ethyl-Morphine Hydrochloride ⅜, Extract of Indian Hemp 2 grains, Glycerin and Cacao Butter *q.s.* In pelvic suppurations with pain, tenderness and general septic symptoms.

Unguentum Crédé. Collargol 15, Adeps Benzoatus 75, Cera Alba 10.

For eczema, syphilis, and gonorrhœa, and as a prophylactic to gonorrhœal ophthalmia.

Argentum Proteinicum, P.G. VI., Ph. Ital. IV., P. Jap. IV., Ph. Ned. V. and P. Helv. (8% Ag.). P. Belg., *Syn.* *Argein (T.M. 364945); Protargen; *Protargol, P. Austr. Argento-Proteinum Forte, 'Strong Silver-Protein,' U.S. X. P. Svec. X. 7·8 to 10% Ag.

Dose (internally).—1 to 3 grains (**0·06 to 0·2 Gm.**).

Trade Mark: 'Protargol' No. 322555. Patent 18478/1897 now ***expired.*** Three methods of making are given in the specification. (1) deals with the precipitation of Protalbumose 4·4 with Silver Nitrate 1, in 1½ of water and the subsequent heating on a water bath of the washed moist precipitate with a warm solution of Deuteroalbuminose 5, in water 4½. The precipitate dissolves and the soluble Silver Proteinate is obtained by evaporating under reduced pressure. (2) Peptone and Silver Oxide are used, and in (3) Peptone and Silver Nitrate.

Characters.—A protein compound, containing 8% of silver, very soluble in water. *Decomposes* with heat.

Solutions ¼ to 1% (or stronger up to 10 and 40%) for ophthalmic use, and from 4 to 20% for wounds and ulcers, are prepared by rubbing the powder into a paste with water and diluting as required with cold or lukewarm (not hot) water. Stains the conjunctiva to some extent. Ointments 5 to 10%. It is alkaline to litmus and precipitates alkaloids, *e.g*, cocaine salts.

Gonorrhœa well treated with ½ to 10% solutions, injections to be made every half-hour and retained five to ten minutes.—M.P.C. ii./11,559.

Bactericidal Power of the Various Silver Preparations.—The organic silver preparations are far less penetrating and active than silver nitrate. See *Vol. II.*

Protargol and Argyrol may be responsible for many cases of conjunctival argyria, a collyrium containing half a grain of sulphate of zinc and 10 grains of boric acid is more cleanly, certain and promptly efficacious than the silver compounds.—S. Theobald, L. ii./11,1570.

'**Sterules** **Ophthalmic** of 10 and 25% solutions are prepared.

'**Collapsubes**' of Silver Proteinate Ointment in paraffin basis, 2% and stronger as required, with catheter attachment are prepared for urethral medication in gonorrhea.

'**Capsungs**' **of Protargol Ointment** contain 2 Gm. of 2% Ointment in Soft Paraffin.

Protargol Jelly. *Syn.* **Schindler's Jelly.**

Solve with slight heat Agar 1 in Distilled Water 200, when cold incorporate Protargol 1.

In treatment of gonorrhœa the Agar has the effect of holding the Protargol in contact with the urethral wall. It must not be used too early before the acute stage has well subsided as it may prove irritating,—nor should it remain in the urethra too long.—L. W. Harrison & C. H. H. Harold, R.A.M.C. Jl., Oct. 1912.

Vide also Manual of Venereal Diseases by Sir Alfred Keogh, Brevet-Col. C. H. Melville, Brevet-Col. Sir William Leishman, and Major C. E. Pollock. Second Edition, 1916.

Leistikow's Bougies have a basis consisting of starch, sugar, dextrin and a little glycerin A silver salt (*e.g.* Silver Proteinate ½ grain for each), is added and the mass is rolled into bougies. Before being used they are dipped in hot water, which makes the outside smooth and slippery. When left in the urethra they slowly dissolve.—*ex ibid.*

Neisser's Bougies. Silver Proteinate 1%, Antipyrin 2% in Cacao Butter or Glycogelatin basis. 4 inches long. For the treatment of gonorrhœa.

Silver Gelatose. P.G. VI. (15% Ag.), P. Svec. X. (16%). *Syn.* *Albargine (T.M. 258119); Patent 23,507/1900, expired 1914.

According to the patent specification, Gelatose (produced by hydrolysis of glutin, etc. by acid or alkali) 10 Gm., is dissolved in water 10 Cc. and mixed after neutralising with Silver Nitrate 1·5 Gm. in water 5 Cc. The mixture is evaporated to dryness *in vacuo*. The salt thus obtained is a yellow white powder soluble to the extent of 50% in water.

Preparation.—For some details of procedure *vide* Edn. XVIII. p. 189.

Characters and Uses.—A non-irritant compound containing 15% silver, of sand-like appearance. Soluble in water (about 1 in 2), and in alcohol 90% about 1 in 130. For gonorrhœa a 0·2% solution injected **four** or **five** times daily. 0·5 to 3% for ophthalmic use.

Incompatible with Chlorides and Tannin.

Silver Gelatose Enema.

Dose.—1 pint increased to 1½ pints of strength 1 grain in 1 ounce on successive days.

Chronic Bacillary Dysentery Treatment.—Medicines *per os* cannot well reach the parts affected,—except, perhaps, large doses of Bismuth which might help to coat and protect ulcers. **Medicated Enemata** advised :—

Experiments showed that Silver Nitrate killed the Dysentery Bacillus in 5 minutes up to a dilution of 1 in 10,000, yet in the presence of a little broth (*i.e.*, albuminous substances) it failed to kill in a dilution of 1 in 100 and 1 in 500—being at once precipitated by the broth. Albargin gave best results in broth, killing the Shiga Bacillus in 5 minutes up to dilutions of 1 in 500 and 1 in 1,000. Collargol, Ichthargan and Argyrol were inert in presence of broth, as also Copper Sulphate and Cuprol (Copper Nucleinate). Cyllin was active up to 1 in 2,500 and Iodine 1 in 1,000, as also Izal.

In bacillary cases the Silver Gelatose Injection is of great value—not in amœbic cases (for these *vide* Emetine).—L. Rogers, B.M.J., ii./13,1199.

Gonorrhœa treated by irrigation with 1 in 4,000 Albargin solution.—D. Lees, B.M.J. ii./21,480.

P1 ARSENIUM.

As=74·96.

P1 *'Arsenic and its Preparations.'*

(Except for Agricultural, etc., purposes, see Schedule of Poisons.)

Applicable to Irish Free State: P1 *'Arsenic and its preparations.'*

P1 *Applicable to Northern Ireland: as Great Britain, except the* 1925 *and* 1926 *alterations to the British Schedule.*

Agricultural and Horticultural Poisons.

According to the Poisons & Pharmacy Act, 1908, *Poisonous Substances, i.e., those containing Arsenic, Tobacco, or the Alkaloids of Tobacco (i.e., Nicotine in particular), used exclusively for the above purposes for destroying insects, fungi, or bacteria, or as sheep dip or weed killers, may be sold in Great Britain and Ireland by Pharmaceutical Chemists, Chemists and Druggists, and Registered Druggists and* by persons licensed by local authorities *who conform to the Regulations of the Privy Council as to storage, transport, etc., providing the provisions of the Pharmacy Acts and those appertaining to the Arsenic Act in the case of Arsenical Preparations are complied with.*

See also Agricultural and Horticultural Poisons at end of the book.

P1 **Acidum Arseniosum.** $As_2O_3=197\cdot92$. *Syn.* ARSENIC; WHITE ARSENIC, ARSENIOUS ANHYDRIDE, ARSENIOUS ACID, ARSENI TRIOXIDUM U.S.

Made by roasting arsenical ores, occurs in white lumps or powder.

Dose.—$\frac{1}{64}$ to $\frac{1}{16}$ grain (**0·001 to 0·004 Gm.**).

Maximum single dose $\frac{1}{12}$ grain (**0·005 Gm.**); maximum daily dose $\frac{1}{4}$ grain (**0·016 Gm.**). Possible fatal dose—2 grains.

Soluble about 1 in 60 of water. This solution is practically neutral, at any rate is compatible with both acids and alkalis. The solubility in weak Hydrochloric Acid solution is about the same. More soluble in Alkaline hydroxide and carbonate solutions. **According to our experiments it is very soluble in Glycerin, at least 1 in 7**—*cf.* **Antimony Oxide.** Physical characters of specimens, however, vary considerably.

Incompatible with Iron Salts, Lime Water, and Magnesia.

Uses.—It is given internally immediately after meals as a general tonic and nerve tonic, as for chorea, in diabetes and anæmia, as antiperiodic for malaria, for chronic skin diseases, and in association with iron, which it appears to render more easily assimilated. Latterly its efficacy in all forms of skin affections has been doubted. Small doses of Antimony it is stated may succeed when arsenic fails—especially in lichen planus. It is said to increase respiratory power (Styrian mountaineers add it to their diet) and to improve the complexion. All preparations of arsenic should be given after food. Externally it has a caustic action, and is put into the cavities of carious teeth to kill the nerves.

Rheumatoid arthritis is treated by Arsenic, but its action is slow and it must be given for weeks or even months.

In certain types of nervous vomiting in childhood, in obstinate cases, small doses of Arsenic and **Opium, just before meals,** are often immediately efficacious.

In tuberculosis may be of use. Arsenic interferes with carbohydrate metabolism, so that after the exhibition of small medicinal doses fat is laid on, especially in the subcutaneous regions. Arsenic also has a favourable influence on growth.—Dixon, Pr. 1913, 1.

For ***further uses*** see Liquor Arsenicalis and Liquor Arsenici Hydrochloricus.

P1 **Pills and Tablets of Arsenious Acid** contain $\frac{1}{120}$, $\frac{1}{100}$, $\frac{1}{60}$, $\frac{1}{50}$, $\frac{1}{30}$ and $\frac{1}{20}$ grain. **P.Jap.IV.** Pills contain **0·001 Gm.** ($\frac{1}{60}$ grain).

Toxicology. An interesting résumé in a paper on "The relationship of Medicine and Toxicology" of numerous *causes celebres* in which Arsenic and Antimony have been found. In one instance Arsenic, given apparently for poisoning, was found in the hair to the extent of 1/22 mgr. in 3 Gm. of hair.—Sir William Willcox, L. i./23,167.

In criminal cases of Arsenical poisoning the symptoms may be those of acute Arsenical poisoning, such as one would expect from a single dose, masked by those of prolonged action of Arsenic. Thus, symptoms of Arsenical neuritis or renal or liver disease may be superimposed upon those of the acute gastro-intestinal symptoms.—Sir William Willcox, B.M.J. ii./22, 118 and L. ii./22, 129,139. ***See Vol. II. for a further abstract of this paper.***

For Arsenic Eating, Arsenical Fly Papers, Weed Killers, Arsenical Wood

Preservatives, Detection of Arsenic in Drugs, Organs of the Body, etc., and Various Arsenic Tests, see Vol. II.

Antidotes.

Stomach tube and emetics, olive oil, calcined magnesia in large quantity, mucilaginous drinks, stimulants and especially—

Antidotum Arsenici, Antidote to Arsenic. P. Dan. U.S. X. (Ferri Hydroxidum cum Magnesii Oxido.) P. Helv. and P. Jap. use Ferric Sulphate, and in other pharmacopœias.

Ferric Chloride 3 (or Strong Solution of Ferric Chloride B.P. '98,3), Water 17. When required for use add this solution to Calcined Magnesia 1, previously mixed with Water 19, and shake well. Should be freshly prepared, and given in doses of a tablespoonful every 5 or 10 minutes, until the symptoms are relieved. Ferric Hydrate should be administered in at least 12 times the quantity of the Arsenic supposed to have been swallowed. The Antidote contains about 2½% of the hydrate.

The diluted Ferric Solution and the mixture of Magnesium Oxide should be kept ready in separate bottles for immediate use.

The following is more expeditious in emergency. *Dilute Tincture of Ferric Chloride ½ ounce with half tumbler of water; add ½ ounce of strong solution of Sodium Carbonate.*

Ferri Hydroxidum cum Magnesii Oxido only delays the average time of death.—H. McGuigan, H. V. Atkinson and G. A. Brough, Jl. Am. Ph.A. per P.J. i./23,483.

Or give Liquor Ferri Dialysatus.

Sodium Hyposulphite.—Arsenical poisoning due to drinking cider from a barrel which had previously contained Arsenic. Sodium Hyposulphite was given by the mouth in 2 Gm. doses, being repeated every time the patients vomited, and from the 8th to the 14th day all the patients (28) were given 20 grains daily. The most severe cases (13 died) were given daily intravenous injections of 7½ grains. No immediate improvement was observed following the use of the drug. To be of possible value in acute poisoning it should be given at once and in maximum doses.—G. B. Lawson and Coworkers, Jl. A.M.A. ii./25,26. *See also Sodii Hyposulphis.*

P1 **Liquor Arsenicalis, Fowler's Solution** (*B.P.* '14). FR. CX., P.G. VI., P. Jap. *Syn.* LIQUOR POTASSII ARSENITIS, U.S. X.

Dose.—2 to 8 minims (**0·12 to 0·5 Cc.**). Contains 1% of arsenious anhydride.—F.I.

FR. CX.—*Max. dose* during **24 hours**, 25 minims approx.

Incompatible with Liquor Strychninæ Hydrochloridi. Employ Liquor Arsenici Hydrochloricus. Poisoning has occurred.

EXOPHTHALMIC GOITRE.—Arsenic is a routine treatment, 5 minim doses of Liquor Arsenicalis thrice daily except during one week in each month, or during the menstrual period, for 6, 8 or even 12 months. May be combined with Bromide, *e.g.*, 3 minims with 10 grains *t.d.* Tincture of Convallaria is recommended if pulse rate be over 110.

PERNICIOUS ANÆMIA.—Arsenic is often given, but it has probably no real value. There is no specific remedy.—P. N. Panton and co-workers, L. i./23, 277. *cf.* the **Liver Diet.**

In HODGKIN'S DISEASE, arsenic should be pushed to the farthest limit short of toxic effects.—Whitla, Pract. Med.

ASTHMA treated by 5 minim doses with breakfast and dinner in conjunction with an alkaline Stramonium mixture.—P.J. ii./10,694.

ANÆMIC VOMITING.—2 minims of Fowler's Solution thrice daily found of great value—to this may be added at once or in the course of a few days 10 grains of Citrate of Iron and Ammonia. Bismuth and Alkalis of little value. —A. P. Beddard, Pr. March, 1912,359.

HERPES ZOSTER relieved by Arsenic—15 drops of Fowler's solution daily being taken for some time.—H. Carlill, B.M.J. ii./17,9.

ARSENICAL KERATOSIS FOLLOWED BY CANCER.—Patient had a more or less general psoriasis, which was controlled by arsenic for 7 years. Warty growths appeared on palms and soles, and the arsenic was stopped. 14 years after cessation of the drug the hyperkeratosis on palms and soles was as obvious as ever, and a tumour, necessitating amputation, developed.—H. C. Semon, B.M.J. ii./22,975.

WARTS and PAPILLOMA well treated by swabbing with Liquor Arsenicalis. —N. R. Houston, Edin. Med. Jl., Jan. '26,31, per Pres., Oct. '26,365.

P1 **Liquor Arsenici Hydrochloricus** (*B.P.* '14). U.S. X.

Dose.—2 to 8 minims (**0·12 to 0·5 Cc.**). Contains 1% of arsenious anhydride. Is compatible with acid mixtures.

In making this by the *B.P.* '14 directions use the entire litre of water with the Hydrochloric Acid instead of half that quantity. Solution is more easily effected.

P1 **Tablets of Arsenious Acid and Mercuric Chloride** 1/64 grain (**0·001 Gm.**) of each.

In exophthalmic goitre have been given thrice daily.

P1 **Mistura Arsenii Quininæ et Ferri**—*Syn.* BACELLI'S MIXTURE (slightly modified).

Dose.—½ to 1 ounce (**15 to 30 Cc.**).

Dissolve Quinine Sulphate 3 in Water 150 with aid of a little Dilute Sulphuric Acid. Then dissolve Green Ammonio-Citrate of Iron 5 in Water 150, mix and add Fowler's Solution 3. Employed in malaria.

P1 **Sodii Arsenis.** *Syn.* SODIUM METARSENITE. $NaAsO_2$=129·957.

Dose.—$\frac{1}{64}$ to $\frac{1}{16}$ grain (**0·001 to 0·004 Gm.**).

A whitish powder soluble in water, slightly in alcohol. Has properties equivalent to Arsenious Acid.

P1 **Arsenii Bromidum.** $AsBr_3$=314·708.

Dose.—$\frac{1}{60}$ to $\frac{1}{12}$ (**0·001 to 0·005 Gm.**).

In yellowish white deliquescent crystals, soluble in water. Is recommended for diabetes and epilepsy.

P1 **Liquor Arsenici Bromatus.** *Syn.* LIQUOR POTASSII ARSENATIS ET BROMIDI. CLEMENS' SOLUTION.

Dose.—1 to 5 minims (**0·06 to 0·3 Cc.**), once or twice a day.

Potassium Carbonate 1, Arsenious Anhydride in powder 1, Distilled Water 80. Boil until dissolved. When cooled, add Bromine (by weight) 2, and Distilled Water, *q.s.* to 100. Heat until decolourised. The solution is useful in epilepsy and diabetes with careful diet.

Contains approximately 1·5% Arsenic Acid, 0·5 to 0·6% Hydrobromic Acid, and 1·6 to 1·7% Potassium Bromide.

P1 **Granula Dioscoridis.** (P. Dan. and FR. Cx.).

Contains 1 milligramme Arsenious Anhydride. *Dose.*—1 to 5.

P1 **Pilula Arsenicalis et Strychninæ** contains $\frac{1}{50}$ grain (**0·0013 Gm.**) of each.

P1 **Pilula Asiatica.** *Dose.*—1 or 2 daily.

Arsenious Anhydride, $\frac{1}{12}$ grain (**0·005 Gm.**), Black Pepper ¾ grain (**0·05 Gm.**), Gum Acacia *q.s.* In chronic skin affections.

In psoriasis this is a convenient method of giving arsenic.

P.G. VI. contains 1/64 grain (**0·001 Gm.**) Arsenious Acid, and ½ grain (**0·03 Gm.**) of Pepper.

P1 **Pilula Ferri Arsenicalis.** *Dose.*—1 thrice daily.

Arsenious Anhydride, in fine powder $\frac{1}{60}$, Exsiccated Ferrous Sulphate 3, Syrup $\frac{1}{2}$; in grains, for one pill; in grammes, for fifteen.

In chlorosis and anæmia most efficacious.

P1 **Pilula Ferri Arsenicalis cum Strychnina** is the same with Strychnine Hydrochloride $\frac{1}{60}$ grain.

P1 **Pilula Acidi Arseniosi et Ferri Redacti.**—Monckton.

Dose.—1 to 3 grains. Arsenious Anhydride, 12 grains. Reduced Iron 1 ounce. Excipient *q.s.* Mix.

P1 **Tablets,** of Arsenious Acid $\frac{1}{64}$ grain and Blaud's Pill 4 grains. *Dose.*—1 to 4.

P1 **Tablets of Arsenic, Iron and Quinine** contain Arsenious Acid $\frac{1}{60}$ grain, Ferric Hypophosphite 2 grains, Quinine Acid Sulphate 1 grain.

D P1 **Pasta Arsenicalis.**—*Martindale.* For dental caries to destroy the nerve.

Arsenious Anhydride, levigated, 30, Plaster of Paris 40, Morphine Sulphate 20, Cocaine 5. Mix and add Clove Oil 5, Phenol 25. **R.D.H.** has Arsenious Acid 2, Morphine Acetate 1, Creosote *q.s.* to form a paste. *These two preparations are very poisonous.*

The equivalent of about $\frac{1}{16}$ grain of Arsenious Acid is sufficient.

Apply as follows:—Remove as much carious tissue as possible, exclude moisture and disinfect. Apply the paste as near pulp as possible and protect by concave cap. Seal cavity carefully with Mastiche in Chloroform.

D P1 **Dental Arsenical Fibre.** *Syn.* **Arsenious Wool. Gossypium Arseniosum, R.D.H.** Arsenious Acid 5, Tannin 2, Morphine Acetate 10, Carbolic Acid liquefied *q.s.* to make a thin paste.

Mix with a sufficiency of finely cut cotton wool. Used in the same way as Pasta Arsenicalis. Some formulæ contain creosote *vice* carbolic acid.

P1 **Arsenii Iodidum.** (*B.P.* '14.) **U.S.** $AsI_3 = 455·756$.

Dose.—$\frac{1}{20}$ to $\frac{1}{5}$ grain (0·003 to 0·012 Gm.), in a pill.

Soluble, forming a slightly cloudy acid solution in water 1 in 11, in alcohol 90% 1 in 40.

The two elements combine forming orange-coloured crystals. It should be recrystallised so as to exclude a melted mixture of Arsenium and Iodine, or Arsenium powdered 10, may be mixed with Iodine 51 in presence of water, digested at gentle heat and evaporated to dryness.

Solution 1% in 1 to 10 drop doses in milk, useful for lymphatic and scrofulous children, has marked iodine effect. Also used externally.

In diseases of the alimentary canal, especially gastritis, in phthisis, and in all cases of neuritis it is of great use. In epilepsy by gradually adding arsenic to the bromide mixture, the dose of the bromide may be lessened and will finally keep the fits under alone. Useful also in helping to clear up a pneumonic lung and in promoting absorption of pleuritic effusion.—L. i./11,1210.

The content of AsI_3 may be estimated by titrating a weighed quantity in an aqueous Sodium Bicarbonate Solution with decinormal Iodine Solution.

P1 Injectio Arsenii Iodidi Hypodermica.

Dose.—$\frac{1}{100}$ grain (0·0006 Gm.) in 6 minims (0·4 Cc.) of sterile water. The strength may be increased if desired.

P1 Sterules, Hypodermic, contain 1/100 grain.

P1 Liquor Arsenii et Hydrargyri Iodidi (*B.P.* '14). P. Jap. III. (now omitted). *Syn.* DONOVAN'S SOLUTION.

Contains Arsenious Iodide and Mercuric Iodide, of each 1%, or 87½ grains of each in Distilled Water *q.s.* to 20 ounces. *Dose.*—5 to 20 minims (0·3 to 1·2 Cc.). (U.S. X. has smaller average, 1½ minims.)

Given for syphilitic skin diseases.

Incompatible with potassium iodide and Sal Volatile (*cf.* Nessler's reagent); also with alkaloids and acids.

See also **P1 Pilula Arsenii et Hydrargyri Iodidi.**

P1 Mistura Arsenii et Hydrargyri Iodidi cum Phenazono.

Syn.—✱HYDRARSAN. (This name was suggested by the late J. C. McWalter, but it is also registered as a T.M., No. 350130.)

Dose.—½ ounce thrice daily after food.

Donovan's solution 2 drachms, Potassium Iodide 1 drachm, Phenazone 1 drachm, Water to 6 ounces.

Method of Preparation. We find the following best:—Powder the Antipyrin and the Potassium Iodide very finely, add a small quantity of water, then the Donovan's Solution with very thorough stirring. By so doing solution is effected. Then gradually add the water with continuous stirring and shaking. In this way precipitation is almost entirely avoided and the mixture is produced slightly opalescent.

SYPHILIS.—The effect seems more potent than that of simple Donovan's treatment. Although immediate improvement follows, the effect does not appear to be very permanent.—M.P.C. i./11,11. See also B.M.J. i./11,1429.

P1 Injectio Sodii Arsenitis et Ferri.

This 'ARSENIC AND IRON INJECTION' has been largely employed in two strengths in anæmic conditions :—

"*No.* 1 *grade* (*weak*)." Hypodermic dose 1 Cc.=0·025 Gm. "Soluble Iron Arsenite," equivalent to ½ milligram of Arsenious Acid, and the other

"*No.* 2 *grade*" (double strength) 1 Cc.=1 mgr. of Arsenious Acid.

Injections may be made (as deeply as possible) with advantage at 1 to 2 days interval, and commencing for the first few doses with ¼ to ½ Cc. only of the No. 1 when the stomach is empty. Intramuscular (gluteal) injections may be better tolerated. The course of the treatment extends over 1 to 2 months.

P1 'Sterules' of "Arsenic and Iron" are prepared of each of the above. *Dose.*—15 minims (1 Cc.) hypodermically.

Physicians should carefully specify which strength is required.

PERNICIOUS ANÆMIA.—The injection intramuscularly appears to be of value: 1/3 grain in 1 Cc. on alternate days for 12 doses would be a suitable course.—Sir W. H. Willcox, L. ii./27,778.

P1 Guttæ Sodii Arsenitis et Ferri.—"IRON AND ARSENIC DROPS." *Dose.*—5 drops (or minims) containing ¾ grain (0·05 Gm.) of "Soluble Iron Arsenite" equivalent to $\frac{1}{64}$ grain (0·001 Gm.) of Arsenious Acid—(*cf. antea*) *per os.*

A gradual increased dose up to 20 drops is recommended.

P1 **Potassii Arsenis.**—*Dose.*—$\frac{1}{32}$ to $\frac{1}{16}$ grain (**0·002 to 0·004 Gm.**). The dry salt $KAsO_2+HAsO_2+H_2O=272·04$, containing about 73% As_2O_3 made from arsenious acid and potassium bicarbonate.

Used occasionally in place of arsenious anhydride.

P1 **Cupri Arsenis.** $Cu_3As_2O_6=436·63$. **Scheele's Green.**

Dose.—1/100 to 1/25 grain (**0·0006 to 0·0025 Gm.**).

Amorphous green powder, used in various intestinal affections, cholera morbus, cholera infantum, diarrhœa, dysentery and typhoid. Dose for adults $\frac{1}{5000}$ to $\frac{1}{8000}$ grain every 10 minutes for an hour, then hourly; for children, half this quantity. Small repeated doses essential. For chlorosis and functional anæmia, $\frac{1}{50}$ to $\frac{1}{25}$ grain thrice daily are given.

P1 **Acidum Arsenicum.**—*Syn.* **Ortho-Arsenic Acid.** $H_3AsO_4.\frac{1}{2}H_2O=150·992$.

Dose.—$\frac{1}{64}$ to $\frac{1}{12}$ grain (**0·001 to 0·005 Gm.**). A crystalline powder soluble about 2 in 1 of water, and very in Alcohol 90%. Arsenites are said to be twice as active as arsenates. The following salts are in use:—

P1 **Ferri Arsenas** (*B.P.*'98). *Dose.*—$\frac{1}{16}$ to $\frac{1}{4}$ grain (**0·004 to 0·016 Gm.**). This is an amorphous greenish powder and consists of Ferrous Arsenate, $Fe_3(AsO_4)_2,6H_4O=553·536$ (not less than 10%) **with** Ferric Arsenate $Fe_2(AsO_2)_2=389·60$, and Iron Oxide. The Ferrous Arsenate rapidly oxidises in the air. In chronic skin affections of all kinds. TABLETS contain $\frac{1}{8}$ grain (**0·008 Gm.**).

The FR. CX. preparation (method given) has formula $(AsO_4)_2Fe_3+3H_2O$—Ferrous Arsenate—with a little Ferric salt. To be kept in bottles sealed down with fat. *Maximum single dose* $\frac{3}{4}$ grain; maximum during 24 hours $2\frac{1}{4}$ grains approximately.

P1 **Sodii Arsenas Anhydrosus** (*B.P.* '14). $Na_2HAsO_4=185·962$.

Dose.—$\frac{1}{40}$ to $\frac{1}{10}$ grain (**0·0015 to 0·006 Gm.**).

Sodium Arsenate crystallises with either 7 [$Na_2HAsO_4,7H_2O=312·080$], **Fr. Cx., Ph. Ned. V., P. Belg.**, or 12 molecules [M.W. = 402·174] of water. The anhydrous salt, in white powder, dried at 150° C., contains 61·8% of As_2O_5, and is soluble 1 in 3 of water at 25° C. 1 of the anhydrous salt equals 1·68 of the salt with $7H_2O$.

F.I. and P. Ital. IV., require the salt crystallised with $7H_2O$ and containing 36·85% of arsenic acid as in many Pharmacopœias.

Soluble 1 in 5 of water. Slightly soluble in alcohol.

FR. CX. (*vide* above) has *max. single dose* $\frac{1}{6}$ grain. *Max. during 24 hours*, $\frac{1}{3}$ grain approximately.

Ulcerative endocarditis. Influence of Arsenic (as Sodium Salt) advised.—J. Lycett, B.M.J., ii./22,402.

Deafness. Sodium Arsenate has been found beneficial, $\frac{1}{12}$ grain in pill followed by $\frac{1}{6}$ grain the next day—altogether 40 to 60 pills in as many days.—per P.J., ii./26,287.

P1 **Pilula Sodii Arsenatis**, $\frac{1}{32}$ and $\frac{1}{64}$ grain.

P1 **Injectio Sodii Arsenatis et Strychninæ.**

Dose.—5 to 10 minims (**0·3 to 0·6 Cc.**) hypodermically. Sodium Arsenate 2 ($\frac{1}{30}$ grain in 10 minims), Strychnine Hydrochloride 1 ($\frac{1}{60}$ grain in 10 minims), Water to 600.

P1 **Sterules, Hypodermic,** contain 10 minims of above.

P1 **Injectio Sodii Arsenatis et Strychninæ et Quininæ** contains 1 grain Quinine Acid Hydrochloride added to 10 minims of the above.

P1 **Sterules, Hypodermic,** contain 10 minims.

P1 **Liquor Sodii Arsenatis** (*B.P.* '14).

Dose.—2 to 8 minims (**0·12 to 0·5 Cc.**). 1% of Exsiccated Salt.

P1 **Pearson's Solution of Arsenic** used on the Continent, is 1 of crystallised Sodium Arsenate ($7H_2O$) in Water 600.

P1 **Arsenical Cigarettes** are made of paper impregnated with sodium arsenate, so that each contains ¾ grain (**0·05 Gm.**) of the salt. The patient ought to inspire the fumes deeply three or four times.

P1 **Tablettæ Sodii Arsenatis Compositæ.**

Anhydrous Sodium Arsenate $\frac{1}{20}$ grain, Lupulin 3 grains.

A digestive tonic combination.

P1 ORGANIC ARSENIC COMPOUNDS.

For the pioneer work on Chemo-therapy readers are referred to the earlier editions of the book.

An organic Arsenic compound, as distinct from the inorganic form, has the Arsenic in combination with a Carbon atom. This appears to lessen its toxic properties. Furthermore, Arsenium acts either as a tri- or penta-valent element and, broadly, the former compounds are more potent upon protozoa. Compare, however, the recently prepared **Tryparsamide**, which contains As^{V}.

A warning may be given as to 'pushing' the dose of these compounds. Signs of disturbance of vision should be looked for.

The following terms are used :—

Arsinic Acid constitutes a dialkyl or diaryl derivative of arsenic acid—*i.e.*, cacodylic acid—and its homologues, *e.g.*, phenyl-arsinic acid, $(C_6H_5)_2AsO.OH$.

Arsonic Acid indicates arsenic acid, $AsO.(OH)_3$, in which one of the hydroxyls is replaced by an organic radicle. An *arsonate* is a salt of this acid. French and German chemists do not as a rule make these distinctions.

Arylarsonate.—This term indicates an aromatic arsonate Aryl indicates *e.g.*, phenyl, tolyl, xylyl, or naphthyl, as applied to substituted hydroxyl in arsenic acid.

Arsenoic.—In French literature refers to aromatic arsenic bodies containing two atoms of arsenic believed to be coupled together by a double linkage—*e.g.* $C_6H_5-As=As-C_6H_5$, arsenobenzene, comparable with $C_6H_5-N=N-C_6H_5$, azobenzene.

(I). *Aliphatic (or Fatty) Series.*

P1 **Acidum Cacodylicum.** **Dimethylarsinic Acid**

$(CH_3)_2AsO.OH=138{\cdot}016$.

Dose.—½ to 2 grains (**0·03 to 0·12 Gm.**).

The ultimate product of oxidation of Arsenium-dimethyl (Cacodyle). *Syn.*—Tetramethyl Diarsine $(CH_3)_2As—As(CH_3)_2$, discovered by Bunsen in 1842, and of Cacodyle Oxide. *Syn.* Alkarsin, $(CH_3)_4As_2O=226{\cdot}016$. Colourless crystals neutral to Methyl Orange. ***Soluble*** about 2 in 1 of water, 1 in 4 of alcohol 90%, readily in chloroform, and although containing 54·3% arsenium, equivalent to 71·6% arsenious acid, it is relatively non-toxic—similarly with the Salts. It will be noted that this acid has only 1 OH group, hence it is not so toxic as its parent arsenic acid, with 3 OH.

Sodium Cacodylate and Arrhenal, according to Fortescue Brickdale, are probably broken down in the body to such slight extent that large doses may be given without producing any therapeutic, much less toxic, effect. They appear, principally in the urine, unaltered. A small proportion is, however, oxidised and from this arsenic Ions are set free, exerting a mild action during a prolonged treatment.

P1 Calcii Cacodylas $[(CH_3)_2AsO_2]_2Ca=314·076$.

Dose.—½ to 2 grains (**0·03 to 0·12 Gm.**) *per os* or intramuscularly.

A white amorphous powder. ***Soluble*** 2 in 1 of water, 1 in 2 of alcohol. In tuberculosis daily injections of ½ grain with a glycerin Solution of Calcium Iodide 10 grains and Ferrous Iodide 1½ grains per drachm internally have been found satisfactory.

P1 Ferri Cacodylas. $[(CH_3)_2AsO_2]_3Fe=466·864$.

Dose.—¾ to 5 grains (**0·05 to 0·3 Gm.**) *per os* per diem, or ½ to 1½ grains (**0·03 to 0·1 Gm.**) hypodermically per diem. *Intravenously* 1 grain (**0·06 Gm.**) in 5 Cc.

Manufacture.—Precipitate the Ferric Hydroxide from a sufficiency of Ferric Chloride solution containing 1 molecular proportion of Ferric Chloride (Fe_2Cl_6 + Aq.). Wash the precipitate and combine with Cacodylic Acid 6 molecular proportions, or precipitate Barium Cacodylate with Ferric Sulphate solution in molecular proportions.

Yellowish powder soluble 1 in 15 of water used for anæmia and chlorosis, also in glandular swellings, *e.g.*, in syphilis, hypodermically.

Iron Cacodylate ½ grain intravenously every other day used for raising the hæmoglobin content.—H. Pritchard, B.M.J. i./27,794.

P1 Guaiacol Cacodylas. $(CH_3)_2.AsO.O.C_6H_4(OCH_3).H_2O=262·08$.

Syn. CACODYLIACOL.

Dose.—½ to 2 grains (**0·03 to 0·12 Gm.**) *per os* or hypodermically in sterile oil in affected regions for tuberculosis. Soluble 1 in 25 water, 1 in 1·5 alcohol 90%.

P1 Magnesii Cacodylas. $[(CH_3)_2AsO_2]_2$ Mg,?H_2O.

Dose.—¾ grain (**0·05 Gm.**) hypodermically, gradually increased (5% solution suitable). White amorphous powder soluble 1 in 3 of water.

Uses, etc., as the Sodium Salt, *q.v.*

P1 Sodii Cacodylas. **P. Helv.** FR. CX. and Supp. 1920, P.G. VI., U.S. X. **Sodium Dimethylarsinate.** $(CH_3)_2AsO_2Na+3H_2O=214·053$.

Dose.—Average per rectum and hypodermically ½ to 1 grain (**0·03 to 0·06 Gm.**).

FR. CX. has *max. single dose* 3 grains and during 24 hours 3 grains approximately.

The salt of the above formula contains 35% Arsenium whilst the anhydrous salt contains 46·8%, equivalent to 61·8% arsenious acid. FR. CX. Supp. 1920 gave a formula $+2\frac{1}{2}H_2O$ (previously anhydrous).

and states the official salt must contain 75 to 78% Anhydrous Sodium Cacodylate. (Not confirmed in Supp. Nouv. 1926). P. Ital. IV. requires it to contain 70%. In commerce it usually contains 18 to 25% of water. It should be carefully examined for inorganic arsenic, and, being a deliquescent salt, solutions should be standardised.

P.G. VI. requires a content of 32·8 to 35% Arsenium.

Soluble 2 in 1 water, in alcohol 1 in 1.

Uses.—In tuberculosis generally (curative results come very slowly), in diabetes mellitus, exophthalmic goître, pernicious anæmia, cancer (particularly of the stomach), malaria, chorea, leprosy, psoriasis, and other chronic skin affections, and in all cases in which arsenic has been used, but when given by the mouth or per rectum may cause renal congestion with albuminuria and fall in the quantity of urine excreted.

As far back as 1862 Cacodylic acid was found to give excellent results in treatment of chronic skin diseases and in pulmonary tuberculosis. It was stated in 1865 (before Koch's discovery of the bacillus) to 'impart to the blood of the patient a condition inimical to the tuberculosis.'

Much later it was employed in syphilis and for the various other purposes for which Arsenic is indicated.

SYPHILIS.—The usual dose has been 1 to 2 grains *intramuscularly* for a week or 10 days. Some proceed to a course of 3 grains for 7 days, with finally 1 grain doses daily subcutaneously. Intermitting the courses for a few days may be well. It seems to destroy the spirochetes. It possesses advantages over Arsenobenzol, and it is still considerably used in spite of this competitor.

Intravenously in sufficient quantity Sodium Cacodylate **is better than Arsenobenzol. Dose never less than 10 grains and often as much as 30 grains repeating the dose in 4 days' time. No toxic symptoms.**—W. H. Forster, Jl. Amer. Pharm. Assn., 1917, 6, 142 (P.J. i./17, 275.)

ENDOCARDITIS treated by **Capps's Sodium Cacodylate Method**—daily intravenous injections beginning with 1 grain and increasing gradually to 5 grains. Free from ill effects.—Sir Thos. Horder, B.M.J. i./26,737.

CHRONIC BRONCHO-SPIROCHÆTOSIS rapidly recovered under sodium cacodylate *per os.*—E. C. Faust, Jl. Trop. Med. Jan. 1/23,14.

PARALYSIS AGITANS has been treated by Sodium Cacodylate intravenously. The usual dosage for syphilis was employed, 1·5 Gm. increasing to 6·5 Gm. in 16 days, altogether 32 Gm.—Jl. Intrav. Therap., May '26.

PERNICIOUS ANÆMIA.—Sodium Cacodylate ½ grain may be given hypodermically daily for 20 days.—Sir W. H. Willcox, L. ii./27,778.

P1 **Elixir Sodii Cacodylatis** (Standardised).

Dose.—30 minims (equivalent to ½ grain of the salt).

This forms a palatable method of administering the salt.

P1 **Pills** contain ½ grain **(0·03 Gm.).**

The following formula in grains is useful:—

Sodium Cacodylate 50, Benzoin 50, Liquorice Powder 50, Acacia Powder 25, Alcohol 90% *q.s.* Divide into 100 pills. *Dose.*—1 three or four times a day.

P1 **Hypodermic and Intravenous Injection.** A sterile preparation is made and standardised to contain 0·05 Gm. ($\frac{3}{4}$ grain) of Cacodylic Acid in 1 Cc. (15 minims approx.), a dose once in 24 hours. The same dose diluted with 4 drachms of water is used for **Rectal Injection.**

P1 **Sterules Hypodermic of Sodium Cacodylate** contain $\frac{1}{2}$, $\frac{3}{4}$, 1, $1\frac{1}{2}$ and 2 grains in 15 minims (**1 Cc.**).

P1 **Sterules of Sodium Cacodylate,** 1 grain (**0·06 Gm.**), **with Nucleinic Acid Solution** 1 Cc. (*see also Acidum Nucleinicum, p.* 281).

SEPTICÆMIA.—Arsenic, *e.g.*, Sodium Cacodylate, intramuscularly may be placed first—given in conjunction with Nucleinic Acid, usually 1 grain of Sodium Cacodylate in a saturated solution of Nucleinic Acid, 1 Cc. intramuscularly being given twice in 24 hours for the first two or three weeks of an acute case. A convenient method of knowing that the patient is receiving an effective dose is the smell of his breath. Opium and specific vaccines.—Sir Thomas Horder, B.M.J. i./25,657.

P1 **Injectio Cacodylatum Compositum.** *Dose.*—(average) 15 minims (**1 Cc.**) containing Sodium Cacodylate $\frac{3}{4}$ grain, Iron Cacodylate $\frac{1}{2}$ grain, Strychnine Cacodylate, $\frac{1}{64}$ grain. It should, we find, be rendered slightly acid with Cacodylic Acid at the finish.

Gautier recommends: ⓅCacodylic Acid 5 Gm., Sodium Carbonate *q.s.*, Cocaine Hydrochloride 0·08 Gm., Creosote 6 drops, dissolved in Alcohol 8 Gm. with Sterile Water *q.s.* to 100 Cc., *i.e.*, 15 minims (**1 Cc.**) contain $\frac{3}{4}$ grain, (**0·05 Gm.**) of Cacodylic Acid for a dose—hypodermically—which is not to exceed 0·1 Gm. ($1\frac{1}{2}$ grains) *pro die*, the average being 0·02 to 0·05 Gm. every 24 hours.

P1 **Solutio de Cacodylato de Sodio Iodo-mercurico Esterilisado** Sodium Cacodylate 4, Mercuric Iodide 0·5, Sodium Iodide 0·5, Water to 100.

Dose.—Each Cc. contains 0·04 Gm. of sodium cacodylate and 0·005 Gm. of mercuric iodide.

P1 **Strychninæ Cacodylas.** $C_{21}H_{22}N_2O_2(CH_3)_2AsO.OH = 472·208$. *Dose.*—$\frac{1}{30}$ to $\frac{1}{10}$ grain (**0·002 to 0·006 Gm.**).

White crystalline powder hardly soluble in water, readily soluble in chloroform. Has proved a useful salt.

P1 **Di-sodium Methylarsenate.** *Syn.* SODIUM METHYL ARSONATE, ARRHENAL 'New Cacodyle' $Na_2AsCH_3O_3,5H_2O = 274·058$. FR. CX.

Dose.—$\frac{2}{5}$ to 3 grains (**0·025 to 0·2 Gm.**) *per os* or hypodermically. FR. CX.—*Max. single* and during 24 hours *dose* 3 grains.

Prepared by the interaction of Methyl Iodide and Sodium Arsenate in presence of excess of Alkali.

Soluble about 1 in 1 of water, only slightly in alcohol 90%.

Arsenic content. (With 5 mols. H_2O)=27·35%.

Uses.—Similar to Sodium Cacodylate *q.v.*

It is stated not to produce Cacodyle Oxide when given by the mouth.

P1 **Sterules, Hypodermic of Arrhenal,** $\frac{1}{3}$ grain (**0·02 Gm.**), and $\frac{3}{4}$ grain (**0·05 Gm.**).

P1 **Mercury Salicyl-Arsonate.** *Syn.* ENESOL.

Dose.—¼ to 1 grain (**0·015 to 0.06 Gm.**) intramuscularly.

A combination of equimolecular proportions of Arrhenal (reckoned anhydrous) and Mercury Salicylate. A white powder containing 38% mercury. It is best supplied in solution. This is said to be painless on injection in syphilis.

P1 **Sterules, Hypodermic of Mercury Salicyl-Arsonate** are prepared, 1 grain in 30 minims, for intramuscular injection.

From the mercury content it would appear that not more than two injections should be given per week. A course of twenty 1 grain Enesol Injections would then result in giving about 8 grains of mercury in 10 weeks. The W.O. method (*v.* p. 199) gives 7 grains in 7 weeks.

P1 ✻**Elarson Tablets** (T.M. 344278). *Syn.* STRONTIUM CHLORARSINOBEHENOLATE.—$Sr(C_{22}H_{39}O_2.As:O.Cl)_2$.

Dose.—1 to 3, thrice daily. Each represents 0·0005 Gm. Arsenic. Used in anæmia, chorea, psoriasis and tuberculosis.

(II.) *Aromatic Series.*

P1 *p*-**Aminophenylarsonic Acid.** *Syn.* **Arsanilic acid, Aniline-arsenic acid.** $NH_2C_6H_4.AsO(OH)_2$=217·034.

Arsanilic Acid is weakly basic. Its Hydrochloride is immediately hydrolised by water. It is soluble, however, in methyl and ethyl alcohol. It has been employed as

P1 **Sodii *p*-Aminophenylarsonas.** *Syn.* ✻ARSAMIN, (T.M. 302016) ✻ATOXYL (T.M. 244636), ✻SOAMIN (T.M. 302133), SODIUM ARSANILATE. $NH_2C_6H_4AsO(OH)O.Na$=239·021.

Usually in commerce + $4H_2O$ = 311·085, and containing about 24% As.

Dose.—¾ to 3 grains (**0·05 to 0·2 Gm.**). This dosage *per os* for syphilis has been advised daily for a week, then to be intermitted, but caution is recommended. Max. single dose 3 grains (**0·2 Gm.**)

Intramuscular injections (into the buttock) have been given of much larger doses, even up to 10 grains at a time, in a total course of 100 grains, at several days' interval in treatment of syphilis as a substitute for Mercurials. The upper third of the buttock is the usual site of injection.—*N.B. Not without danger.*—Avoid heroic doses.

Intravenously 1 to 5 minims (**0·06 to 0·3 Cc.**) of a 15% solution have been given, *i.e.* approx. ⅐ to ¾ grain, but larger doses have been used, and we should advise 1 Cc. at least of diluent.—*Cf.* Intrav. Dose Table.

Solutions should be freshly prepared with cold boiled water and may be slightly warmed at time of injection.

Manufacture.—It was originally prepared by Béchamp *vide* Comptes Rend., 1863, Vol. 56, I., p. 1172, though the substance he obtained he thought to be Arsenic Anilide. By heating Arsenic Acid with an excess of Aniline the Arsenate is formed, this however is transformed by prolonged heating at 190°C into *p*-Aminophenylarsonic Acid. This attained, one neutralises with Sodium Carbonate, decomposes with Nitric Acid, collects the Acid, neutralises with Sodium Hydroxide, and evaporates to crystallise. Recrystallise from 90% Alcohol.

HISTORY OF ORGANIC ARSENIC COMPOUNDS in treatment of protozoan diseases.—Benjamin Moore, B.M.J. i./16,617. See our Edn. XVIII., p. 202.

A white crystalline powder with slightly saline taste.

Soluble about 1 in 6 of water (some samples may dissolve in a little less). Also soluble about 1 in 125 of alcohol 90% and more so in Methyl Alcohol. The Anhydrous substance is readily soluble in Methyl Alcohol but practically insoluble in Ether, Acetone, Benzol, or Chloroform.

Incompatible with Mercurials (*e.g.*, Perchloride), and other heavy metals in solution, also with Acids.

Uses.—Large quantities of arsenic can be given by it in skin diseases (psoriasis, lichen), in anæmia, syphilis, sarcoma, elephantiasis, malaria, tuberculosis and trypanosomiasis. Syphilis has been treated with 50% Ointment used on chancre of the skin.

It is stated to have less than 1/40 the toxicity of Arsenious Acid.

P1 **Pills of Arsamin** contain ½ grain and upwards. P1 **Elixir Arsamin** contains ½ grain in each drachm and may be prepared stronger if required. P1 **Sterules (Hypodermic) of Arsamin** ½ also ¾ grain in 15 minims (**1 Cc.**) of water.

Purves Stewart has prescribed the Elixir considerably in cases of disseminated sclerosis and tabes without having witnessed bad effects from the drug, but cases must be watched carefully.

P1 **Arsamin Paste.** 10% may, from our experiments, be prepared with **Pigmentum Caseinæ**, *q.v.*

In syphilis this has been used to primary sores, with large injections of Atoxyl simultaneously into the buttock.

P1 **Tablets Arsamin** contain one grain. P1 **Capsules Arsamin** 1 and 2 grains, also P1 **Capsules Arsamin** 1 grain with **Blaud Pill** 5 grains and with **Quinine** 3 grains are prepared and are useful for treatment in cases where the added drugs suggest themselves.

For Methods of Testing Sodium Arsanilate for inorganic Arsenic, see Vol. II.

Sodium Arsanilate plus Mercury.—Combined have been used without much favour.—**Sodium Arsanilate plus Orpiment** (Arsenic Trisulphide $As_2S_3 = 246{\cdot}112$) were also largely given. The trypanosomes probably never become resistant to inorganic Arsenic.

Sodium Arsanilate plus Tartar Emetic was also tried.

Syphilis.—Though Atoxyl is a cure, it is no longer used, as it dissolves in the tissues of the eye and causes optic neuritis and atrophy.—W. E. Dixon, B.M.J. i./25,813.

Sodium Arsanilate plus Bismuth (*v.* p. 241).

Relapsing Fever. Large doses have been given, *e.g.*, doses of from 9 to 23 Cc of 20% solution.

KALA-AZAR. **Success has followed 3 grains every third day.**

Trypanosomiasis.—Thomas of Liverpool first applied Atoxyl in trypanosomiasis. 2 Cc. of saturated solution (about 20%) as first dose—repeated after 18 days. Immediate effect was magical, but it only helped the sufferers in dying. Koch thought it to be a specific.

Initial doses of ¼ Gm increased to 1 Gm. have been given.

p-Amino-phenyl-arsonic Acid acts promptly on trypanosomes, the *meta*-Acid has less effect and the *ortho*-Acid no effect at all. Both the presence and the position of the Amino group are important factors.—L. ii./12,1822. See also Fortescue Brickdale, B.M.J. ii./12,1489.

Ehrlich pointed out that a drug can only be of value in infectious diseases, if taken up more readily by the parasite—bacterio-tropous (*syn* ætiotropous)—than by the organism—organotropous Many protozoa take up dyes—**Trypan Red** (from 1 molecule tetrazotised benzidene-mono-sulphonic acid and 2 molecules sodium naphthylamine-3 : 6-disulphonate) is active against trypanosomes.

He advised the use simultaneously of a number of substances, *e.g.*, Atoxyl, Parafuchsin, Trypan Red and Trypan Blue,* chosen in such manner that their actions are concentrated on the parasites—distributed over several different organs. Combine a potent substance which will kill off the bulk of the trypanosomes with a weaker one, which will account for the few remaining trypanosomes, which otherwise would certainly cause a relapse in course of time. Mercuric Chloride has been demonstrated a useful adjuvant to Atoxyl treatment—alone it (Mercuric Chloride) is incapable of complete curative action.

Elimination is by the skin and especially by the kidneys. May cause transient albuminuria. Part may be taken into the body, but the bulk is in the urine unchanged or as allied substance.

In man the excretion of Atoxyl usually amounts to 50–90% within nine hours. The amount remaining in the body is to some extent decomposed, so that after sufficient time has elapsed the ordinary toxic symptoms of inorganic Arsenic are produced. Fortescue Brickdale can see no advantage in giving in syphilis and the grave forms of anæmia a rapidly eliminated form of Arsenic in large dose rather than one which being slowly excreted can be given in small doses In the case, however, of trypanosomes the organic Arsenic may play a different role. Here it is thought that a small amount combines, through the Amido group, with the proteins of the blood plasma, from which the Arsenic is set free by an oxidation process, and thus in a nascent condition kills the trypanosomes—B.M.J. ii./10,1598.

For poisonous effects and their treatment, see Vol. II.

For further details of action of Arsanilate and allied bodies on Trypanosomes *vide* 'Salvarsan,' by M. & W., p. 168 *et seq.*

P1 Sodii Acetylarsanilas.

Syn. SODIUM ACETYL-P-AMINOPHENYLARSONATE, ✱ARSACETIN (T.M. 305705), P.G. VI., ACETYL-ATOXYL.

$C_6H_4NH.CO.CH_3.AsO_3HNa = 281{\cdot}037.$ (P.G. + $4H_2O$.)

Dose.—Per os ½ grain (0·03 Gm.) three or four times a day.

In syphilis, malaria, trypanosomiasis. A course of 20 injections of 0·6 Gm. spread over 10 weeks. In the case of diseases of metabolism smaller amounts —0·1 to 0·3 Gm.

Caution.—This dosage is quoted in Gehe, but the preparation came under serious consideration years ago. Bagshawe, L. ii./09,1193, reported blindness after its use in trypanosomiasis.

In syphilis, 0·5 Gm. was toxic.—L. ii./08,1315.

P.G. VI. states maximum single dose 0·2 Gm.

For further data see E.P. XVI., p. 167.

Arsacetin specially recommended in pernicious anæmia, leukæmia, and lymphadenoma.—B.M.J.E. ii./24,63.

P1 Sodium *p*-Hydroxy-*m*-Aminophenylarsinate or '189.'

First results of treatment show that this salt has favourable action on human syphilis although not so powerful or constant in its results as Salvarsan. It is relatively slightly toxic and is supported by patients who do not tolerate other arsenical preparations.—J. C. S.. 1922, Ai 300.

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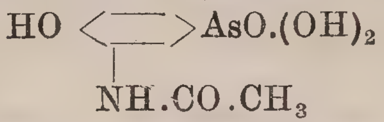
* **Trypanblue** $C_{24}H_{24}N_6O_{14}S_4Na_4 = 960{\cdot}484$ has been proved successful in the treatment of piroplasmosis,—*biliary fever* or *malignant jaundice* of the dog (canine *piroplasmosis*) and *red water* or *Texas fever* of cattle (bovine piroplasmosis) It is also stated to be a certain and immediate cure for distemper, but we know of a case in which it proved useless. *Dose.*—Dogs 2 months old, of 3 to 5 lbs. weight 3 Cc to 4 Cc. of ½% Solution. From 10 lbs. to 60 lbs. weight, dose ranges from 3 to 20 Cc. of Saturated Solution (1% approx.). Subcutaneously, or in preference intravenously, into the vena saphena in the hind leg of a dog.

Cattle.—*Dose* —100 to 200 Cc. Saturated Solution

Trypan Blue is a remedy for piroplasmosis in domestic animals, but no other success is recorded.—Dixon, p. 22. See also B.M.J. ii./22,410.

Chlorazol Blue 3 B is a color closely related and has been used instead of Trypan blue.

*[P1]**Stovarsol.** (T.M. 432473). *Syn.* SODIUM ACETYL-AMINO-HYDROXY-PHENYL-ARSONATE. *SPIROCID. (T.M. 341748.)



$$HO\langle\overline{\quad}\rangle AsO.(OH)_2 \quad (NH.CO.CH_3)$$

Dose.—4 grains (**0·25 Gm.**) in Tablets *per os.* Stated to be readily absorbed from the gastro-intestinal tract.

Manufacture.—The following may be suggested. Convert the amino group in Arsanilic Acid into the Oxalyl compound (Bertheim Ber. 1911,3092); nitrate and hydrolyse with strong Caustic Soda solution forming 3-nitro-4-hydroxyphenylarsonic acid (Benda Ber. 44, 3449). Reduction at 0°C. is followed by acetylation and conversion into the sodium salt.

Uses.—In amœbiasis, frambœsia (yaws), lambliasis and the early treatment of syphilis.

In amœbiasis (acute cases) destruction of cysts entails dosage of two tablets per day for 10 days. Stated to cure when Emetine has failed. In chronic cases, 1 tablet the first day, later one tablet every other day for a week, then one tablet twice a week for several weeks (For the combined treatment with Auremetine, *v.* p. 537.)

YAWS.—The following has been advised: Two tablets the first day, three the second day, four the third day. Omit for one day, then four, three, and two tablets respectively on alternate days.

LAMBLIASIS.—One tablet a day for six days. The dose may be doubled and treatment extended, in cases with cysts. The dosage for children should be *pro rata.*

Has also been used in psoriasis, Vincent's angina, and spirochætal infections of the mouth.

REFERENCES.

Amœbic Dysentery.—There is no evidence that it is a direct amœbicide, but it has definite value in the chronic stage.—P. H. Manson-Bahr and R. M. Morris, L. ii./25,546.

Combined treatment of amœbic dysentery (in France) with Stovarsol and Emetine lasts 4 weeks and consists of administration of 50 cgm. of Stovarsol a day during 1st and 3rd weeks, and Emetine during 2nd and 4th weeks. The 'opening' treatment with Stovarsol alone consists of administration of 75 cgm. a day for 1 week, discontinued following week and resumed on 3rd week, followed for one or two months by daily dose of 25 cgm. Amœbæ disappear in 4 days and cysts in 8 days. Affects *Lambliæ* but *Trichomonas* resist it. Superior to Novarsenobenzol.—Ch. Garin and P. R. Lepine, Int. Conf. Trop. Am., '24,314.

A failure in practically all acute cases of amœbic dysentery, but has tonic properties and worthy of further trial in anæmia or lowered vitality from whatever cause.—Drennan, U.F.C., '25,123.

YAWS.—It cures lesions which have proved resistant to Arsenobenzenes. It has also cured other spirillary diseases, *e.g.*, intestinal spirochætosis, ulcer-membranous-stomatitis, spirillary bronchitis, phagedenic ulcer, and Vincent's angina.—C. Levaditi, L. ii./25,595.

Yaws well treated with 2·5 to 3 grains every 7 days; as much as 4—5 grains given, according to weight of patient, larger doses cause febrile reaction and diarrhœa. Patients increase in weight. Dose for children 0·09 grains per kilo given three times with a week's interval.—per Jl. Trop. Med., Apl. 1, '26,115. Good results in children of 1 to 3 years.—N. A. Dyce Sharp, Jl.Trop.Med., Jan. 15, '27,21.

LAMBLIASIS.—Produces immediate improvement with disappearance of cysts. Blastocysts, the cause of diarrhœa, always destroyed.—Marchoux, L. ii./25,595.

MALARIA.—Found efficacious *per os* in tertian and quartan fever. Marchoux considers it is effective against *Plasmodium vivax*, but not against *P. malariæ* or *falciparum*.—per L. ii./25,595. See also Jl. Trop. Med., Oct. 15, '25,376, and Pres., Jan. '27,26.

Little, if any, effect on malaria, either as a prophylactic measure or in acute malarial fever as a therapeutic measure.—H. C. Clark, U.F.C., '25,192.

Cannot take the place of Quinine, but is useful in chronic cases in convalescence.—Macphail, U.F.C., '25,123.

Has specific action in destruction of *Balantidium Coli*.—R. Aguilar, U.F.C., '25,247.

SYPHILIS well treated, by daily doses of 1 Gm., with a total of 20 Gm. in the month. It is the most active antisyphilitic agent which can be given by the mouth. In some cases it is satisfactory alone, but a drug such as Bismuth may also be required. Has a general tonic action on the whole system.—C. Levaditi, L. ii./25,594.

Congenital syphilis in infants of 2 months treated with a daily dose of 0·12 Gm. for 4 days a week up to a total of 6·6 Gm.—B.M.J.E. i./26,52.

SPIRILLUM OR TICK FEVER.—Stovarsol gave good results.—A. T. Schofield, B.M.J., ii./27,1140.

CHRONIC RESPIRATORY DISEASES treated with doses of 0·5 Gm., given for 10—15 days, interrupted by intervals of equal duration. Hepatic or renal insufficiency contraindicated. May be given to children in smaller doses.—B.M.J.E. i./26,48.

VINCENT'S ANGINA and ulcerating stomatitis treated.—B.M.J.E. i./26,35.

One tablet of Stovarsol (0·25 Gm.) taken immediately after breakfast made a man violently ill. Copious draughts of warm water, also a Ferric Hydrate mixture, produced recovery. Symptoms were suggestive of Arsenic poisoning.—J. R. O'Brien, L. i./26,313.

P1 **Bismuth Acetyl-amino-oxy-Phenylarsonate.** *Syn.* ✱BISTOVOL (T.M 460757). ARSYBISMOL.

For adults a series of 12 injections of 2·5 to 3 Cc. at intervals of 4 to 5 days has been suggested.

Stovarsol and Sodium Potassium Bismuth Tartrate interact, producing a white precipitate of this body. Ampoules contain 3 Cc. of 10% suspension in oil. Has a curative effect both on animal and human syphilis. It is injected intramuscularly in suspension in either saline or oil. With mice, found of value for *Trypanosomiasis nagana*. In general, the ill-effects of Bismuth or Arsenic are not observed.—C. Levaditi, L. i./26,215; B.M.J. i./26,207; J.C.S.A. i./25,1005.

P1 **Bimital** is an allied compound. *Dose,* 2 Cc. of 10% oily suspension intramuscularly in syphilis. It occurs as a yellow insoluble powder containing 41% Bismuth and 15% Arsenic.—C.D. ii./25,434.

✱ P1 **Acetylarsan** (T.M. 444635).

Available in solution containing 23·6% of Oxy-acetylamino-phenylarsinate of diethylamine. Solution contains 0·05 Gm. Arsenic per Cc. Elimination complete in 36 hours. Trial injections of 1—2 Cc. subcutaneously or intramuscularly and then 8—10 weekly injections of 5 Cc.—L. i./27,26. See also B.M.J., i./27,111.

The compound itself is a white, crystalline substance, soluble in water. Subcutaneous or intramuscular injections are painless and the drug is only slightly toxic. Used in hepatitis with success—dose, 0·75 Gm. once a week for 4 weeks. Treatment of *amœbiasis* (in France) with Acetylarsan and Emetine combined lasts 4 weeks, Emetine being administered the 1st, 2nd and 3rd day of each week and Acetylarsan on the 4th day in dose of 0·75 Gm. The opening treatment with Acetylarsan consists of primary injection of 0·75 Gm., with 3 days later a second dose of 0·75 Gm. and a succession of injections of same dose at intervals of 8 days until 6 or 7 doses have been given. Amœbæ disappear shortly after 8th day; cysts disappear at same time and in same way. *Lambliæ* disappear the morning following the first injection, as also *Trichomonas*. Less toxic and more effective than Novarsenobenzol.—Ch. Garin and P. R. Lepine, Int. Conf. Trop. Am. '24, p. 315.

P1 Dioxy-diamino-arseno-benzol Di-hydrochloride,—ARSENO BENZENE, ARSENOBENZOL[*], ARSPHENAMINE (U.S. X.), ARSEN PHENOL-AMINE, AMINO-ARSENO-PHENOL, ∗ARSENOBILLON (T.M 413809), DIOXYDIAMIDO-ARSENOBENZOL DI-HYDROCHLORIDE ∗KHARSIVAN (T.M. 363586), ∗SALVARSAN (P. Argent II.), P.G VI., EHRLICH-HATA, or '606,' $C_{12}H_{12}O_2N_2As_2(HCl)_2 2H_2O$=474·994

The compound is believed to have a di-benzol nucleus coupled togethe by two trivalent Arsenic atoms.

For ***Dose and Methods of Injection*** see p. 197 *et seq*

PATENTS.—By the Patents Designs and Trade Marks (Temporar Rules) Act, 1914, licences to use German-owned British patents wer granted to several firms. These were suspended and the Britis and French firms used the patents by agreement with the origina German owners.

Salvarsan and Neosalvarsan are now made in sufficient quantitie in Great Britain.—D. Lloyd Howard, P.J., ii./26,633.

Patents concerned were 3934/07, 13485/10, 5595/11, 7865/12 8219/12 and 6322/15. *These have all expired.*

Details of procedure are given in "Salvarsan" by M. & W.

The following were also ancillary to the main patents for makin Arsenobenzol:—No. 11,625/11 ("Substituted Aromatic Arsines" and 15,931/12 ("Arseno preparation").

Further, Patent 17,619 of 1907 entitled "Reduction-products o *p*-amino-phenyl-arsinic acid and its derivatives" became void **The substance referred to in this patent is known as '418' (Ehr** lich's number), and is similar to Arsenobenzol.

TRADE MARKS: "SALVARSAN" and "NEOSALVARSAN."

No. 310235 for the former and Nos. 340386 and 340387 for th last-mentioned were "suspended" in favour of British house during the war, but this order was *revoked* in 1923.

Therapeutic Substances Act, 1925.—Under thi Act and the Statutory Rules and Orders 1927, No. 486, in forc since August, 1927, the substance Arsenobenzol, commonly know as *Salvarsan, and analogous substances used for the specific treatmen of infective disease,* are subject to control by Licence, under th Minister of Health in England and Wales, the Scottish Board o Health in Scotland, and the Minister for Home Affairs in Norther Ireland, both with regard to manufacture and standards of strength quality and purity.

The **Standard Preparations** of Arsenobenzene, etc., are kept in the Nationa Institute of Medical Research, Hampstead. Biological Tests and tests fo stability are applied. The label must state that the contents have bee tested in accordance with Regulations under the Act.

Introduction.—**Ehrlich and his assistants (notably S. Hata o Tokyo) conducted research (*vide* "Die Experimentelle Chemotherapi der Spirillosen"), which led finally to the introduction of Arsenc benzol for treatment of syphilis and many other affections.**

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[*] The preparation is on the market under this name in hermetically seale glass tubes each containing 0·6, 0·5, 0·4, 0·3, 0·2 or 0·1 Gm. filled with ine gas to prevent oxidation. If discoloured—either grey or brownish—it mu not be used.

Treatment with this chemical compound of a person infected with syphilis, it was hoped, would effect a "sterilisation of the system."

For further notes on the Introduction of the compound, Parasitotropic and Organotropic Compounds, Therapia Sterilisans Magna, Antibody Formation Theory, see Vol. II.

Under "Preparation of the Injection" (*see Vol. II.* and this Vol. p. 198), we show the quantity of alkali required to neutralise or dissolve given doses of Arsenobenzol Di-hydrochloride according as a suspension or solution is desired, thus reducing the possibility of adding marked excess of caustic alkali, which would be (and probably has been) attended with grave consequences to the patient if injected in the gluteal muscles, subcutaneously or by the intravenous method.

Arsenobenzol solutions kill protozoa *in vitro*, and the $\frac{C}{T}$ dose ratio, *i.e.*,

$$\frac{\textit{Curative dose or sufficient to destroy all parasites}}{\textit{Toxic dose or Max. dose which patient can tolerate}}$$

for the substance is satisfactory.—Ehrlich maintained that this ratio must be $\frac{1}{3}$ or less for a drug to be of value in this type of disease.

Note.—The **Chemotherapeutic Index (R)** $= \frac{\text{M.T.D.}}{\text{M.C.D.}} = \frac{\text{Max. tolerated dose}}{\text{Min. curative dose}}$

If it is fairly large (5 to 10), the minimum curative dose is sufficiently far removed in quantity from the maximum dose tolerated for the drug to be useful. In the case of the Veronal group introduction of one unsaturated (Allyl) group increased the therapeutic action more than the toxicity, so the R is raised. The most efficient and safe members are the Diallyl body (Dial) and the Isopropyl compound.—G. Malcolm Dyson, P.J. i./26,3.

Specific Nature of the Treatment.

Ehrlich made numerous statements regarding *specific action* of Salvarsan. The subject is fully dealt with in "Salvarsan" by M. & W., pp. 19, 20.

The percentages of deaths and of evil after-effects consequent on the Arsenobenzene treatment has undoubtedly been small when the nature of the substance and the technique required are taken into account.

Manufacture.—*p*-Oxyphenylarsonic acid—$C_6H_4.OHAsO(OH)_2$ on nitration and subsequent reduction under certain conditions produces a condensation of two molecules forming ultimately the Dioxy-diamino compound. This base is then converted into the Di-Hydrochloride.

Vide Patent Specifications *antea* for further details.

Commercially, free and combined Sulphur have been found in it.—F. L. Pyman, C.D. i./20,404.

The varying toxicity of commercial samples is apparently due chiefly to presence of sulphonic derivatives formed during reduction process with sodium hyposulphite. If **hypophosphorous acid** is used the product is relatively non-toxic.—J.C.S.A., 1920, 42, p. 2402. T., 1921, 1109 and 1415.

The compound forms a bright yellow powder containing 31·6% approximately of Arsenium. According to the Therap. Substances Act not less than 30% or more than 34%.

Soluble in water 1 in 5 forming a thick syrupy liquid with acid reaction, but not acid to Congo-red paper, 1 in 3 Methyl Alcoh and in Glycerin; 1 in 12 in Ethyl Alcohol. Insoluble in Ether.

The Di-Hydrochloride may be converted into the basic substan Dioxy-diamino-arsenobenzol (No. 592 in Hata's series) of the formu $C_{12}H_{12}O_2N_2As_2$=365·982 by treatment with alkali. This ba is an unstable, easily oxidisable, *insoluble* substance containi 40·96% of Arsenium—readily soluble however in Alkalis.

Uses.—Arsenobenzol has the disadvantage of requiring i acidity neutralised at the time of use, and for this reason it has bee largely replaced by Novarsenobenzol. The compounds ar however, very similar in other respects, so that the description uses, after-effects, and contraindications given below applies al in a large measure to Novarsenobenzol.

It is now fairly well determined that a syphilitic chancre, a seco dary syphilide or ulceration, or a tertiary gumma or ulceratio yields remarkably to this body, as also to Novarsenobenzol; ever stage of syphilis treated, however, *requires Mercury subsequentl* They are also of value in acquired or congenital syphilis, but parasyphilitic affections they have not yet been proved of grea benefit, though they may prevent their progress.

Visceral syphilis, Discussion on—especially of the central nervou system and cardio-vascular system. Sir Clifford Allbutt stat that the syphilitic process wherever it is found consists in a lymp arteritis with consequential irritative and atrophic effects. Th division of syphilis into time periods—primary, secondary, tertiar and visceral—is misleading. The pyrexial phase, slight as it ma be, indicates a general syphilitic sepsis in which the cerebro-spin system is soon involved. Early necropsies have shown that i the pyrexial phase the aorta, brain, liver and other viscera becon infected and the cerebro-spinal system does not long escape.— B.M.J. ii./21,177.

Although Salvarsan may kill all spirochetes in the skin and mucou membranes, it may not go deeper—hence, both exospinal and intra spinal treatment may be needed from an early stage. Col. Harriso has made the 'unpleasant' (—reasonable—W. H. M.) reflectio that within limits the more parasites we kill the better time may be for the rest. Small repeated doses preferable to two three big doses.—Sir T. Clifford Allbutt, B.M.J. ii./21,177.

The spironema is *not killed by Salvarsan—the body of the patie co-operates.*—H. H. Dale, B.M.J. i./22,807.

Organic Arsenic Compounds have no marked effect on t spirochaetes in the test-tubes, but they destroy them in the body. Prof. W. E. Dixon, B.M.J. ii./22,410.

Note.—Writers designate the causative organism of syphil Spirochæta, Spironema, Treponema, etc.

Use in Malaria, Yaws, Framboesia, Leprosy, Pernicio Anœmia and other diseases—It is thought that not only is substance specific for syphilis, but that it probably acts against *Spirill* in general.

Tertian Malaria has been cured but quartan does not seem to respond in the same way.—Sir W. H. Willcox, B.M.J. i./16,473.

Benign tertian infection. Arsenobenzol intravenously has a definite parasiticidal effect, but not on any stage of the malignant subtertian parasite; it intensifies Quinine—J. Pratt-Johnson and co-workers, B.M.J. i./21, 81.

Yaws has been treated by intramuscular injection. 0·6 Gm. injected into the buttock gives astonishing result. 12 intramuscular injections of Hectine, given daily, only equal in result one dose (0·6 Gm.) of Novarsenobillon. —N. Cantlie, Jl. Trop. Med., Feb. 1/23,37.

Within 40 hours of injection of Neosalvarsan all treponemata demonstrable by Levaditi's method disappeared from early yaws.—E. W. Goodpasture, Jl. Trop. Med. July 2/23, 234. See also *ibid.* July 15/22,240.

Frambœsia, five cases (3 adult, 2 children), in Trinidad, injected with 0·6 Gm. (in an emulsion of 5 to 6 Cc. sterile Olive Oil for the adults) deeply into the muscle of the buttock. Improvement in 24 hours, the yaws tubercles drying up from the periphery.

Among 900 cases of frambœsia in Surinam there were only three unsuccessfully treated.—L. ii./11,1303.

Vincent's Angina.—A throat swab dipped in Glycerin and this in the powder and rubbed on to the affected parts in the throat. Not painful. Relief afforded after a few hours.—L. ii./13,1120.

Leprosy.—Some reports have been favourable.

Pernicious Anæmia.—Two cases each received four doses 0·2 to 0·3 Gm. intramuscularly. Marked improvement. Red and white corpuscles as also hæmoglobin content increased.—Byrom Bramwell. (This authority introduced the Arsenic treatment of pernicious anæmia in 1875.)

Salvarsan not advised, as it is best given intravenously, and there would be danger in its use in pernicious anæmia.—Sir W. H. Willcox, Pr. Sept. 1913.

In Small-pox, no influence; Typhus favourable; in Relapsing Fever more active than in syphilis.—B.M.J.E. ii./11,4.

Rat-bite Fever successfully treated by Novarsenobillon 0·4, 0·6 and 0·9 Gm. at intervals.—G. C. Low and R. P. Cockin, B.M.J. i./18,203.

Kharsivan and Neo-Kharsivan in diseases other than syphilis—lupus sycosis and eczema.—G. Stopford-Taylor, B.M.J. ii./18,431.

Experimental determination of minimum lethal, minimum effective and maximum tolerated doses of Arsenic and Antimony compounds in trypanosome infection.—C. Voegtlin, H. W. Smith and co-workers, per T.D.B. 17/21,330.

Cancrum Oris in Formosa. Salvarsan has reduced mortality rate from nearly 100% to 25%.—D. J. Maxwell, Jl. Trop. Med., July 2/23,235.

On *microfilariæ bancrofti*, intramuscularly, has toxic action. Periodical injections suggested for persons suffering from lymphangitis, funiculitis, etc., taking into consideration age and general condition of patient.—F. Noc., per Jl. Trop. Med., July 2/23,238.

Administration.—Arsenobenzol is usually given intravenously, or by intramuscular injection into the gluteal muscles. The latter procedure is stated to be more effective, but great after-pain is produced.

It has been employed subcutaneously, but this method is not advised (for references see Edn. XVIII., p. 211).

For use *per rectum* it has been administered in suppositories and by injection (see **Suppositories** *postea* and Edn. XVIII., p. 211).

(i.) *INTRAVENOUS INJECTIONS.*

Dose.—For women the average is 0·3 to 0·4 Gm., and for men 0·4 Gm., *diluted to about* 200 *Cc.* repeated in two, three or four weeks. In feeble patients, or where the central nervous system or heart is affected, smaller doses (0·1 to 0·3 Gm.) may be given, and repeated, if the first injection has been well tolerated, after a few days. Generally a course of 4 to 8 doses is given at intervals of 8 or 10 days—often in conjunction with Mercury. See '*Combined Treatment*' *postea.*

For *children* doses of 0·2 to 0·3 Gm., and for infants 0·02 to 0·1 Gm. have been given.

Preparation of the Injection.

In our experience it is best to add to the Arsenobenzol solution sufficient 15% *w/w* Caustic Soda solution to precipitate the *base*, *i.e.*, 0·28 Cc. for 0·3 Gm., mixing thoroughly: dilute with a little 0·5% saline and then add just enough of the Caustic Soda solution to dissolve (about 0·6 Cc. *in all*), finally diluting to 300 Cc. with 0·5% saline solution.

The minimum amount of alkali should be employed, as found experimentally sufficient to dissolve. **The quantity of Alkali thus** added converts the body into the *Di-Sodium Compound.*

The solution should be freshly made.

The intravenous injection is given in the usual way, by gravitation or employing slight pressure, into a vein at the elbow, a little saline being given first and at the finish. It should be given at about 105° F., *i.e.*, a little above blood heat, and is generally painless. About 30 Cc. per minute can usually be safely given.

Patients should be treated in bed and observed for at least three days. If patient shows during administration any signs of collapse, injection should be stopped at once

(ii.) *INTRAMUSCULAR INJECTIONS.*

Dose.—Injections of 0·1 to 0·2 Gm. suspended in oil have been given every second day until a total of 1·2 Gm. is reached.

Preparation of the Injection.

The following have been used:

(*a*) **Alkaline Solution.**—Triturate 0·3 Gm. Arsenobenzol in a sterile mortar with 12 drops of 15% *w/w* Sodium Hydrate solution or *q.s.* to dissolve, avoiding excess, and dilute with Distilled Water to 5 Cc. or the desired volume. For larger or smaller dose use corresponding amount of Alkali (*cf.* Intravenous Injection).

(*b*) **Sterile Aqueous Solution of Arsenobenzol** 10%.

(*c*) **Oil Suspensions** 10%, in Liquid Paraffin, Olive, Almond, or Sesame Oil. Injections (*b*) and (*c*) are, in our opinion, ill-advised on account of their acidity.

(*d*) **Neutral Suspension.**—Triturate the Arsenobenzol with sufficient 15% *w/w* Caustic Soda solution to precipitate all the base (0·3 Gm. requires 4 drops), then add the requisite amount of sterile water. (For 0·6 Gm. the final volume should be 10 Cc., otherwise it is too thick.—W. H. M. For all these a wide lumen needle will be wanted.) The fine suspension produced is tested with litmus paper for neutral reaction and adjusted with Caustic Soda solution or Dilute Hydrochloric Acid.

Administration of the Injection.—The injection is made deeply and slowly into the upper exterior part of the gluteal muscles, avoiding tearing and hæmorrhage of the muscles. The neighbourhood of the sciatic nerve must be carefully avoided.

The part may be massaged afterwards to spread the injection over as large an area as possible.

The patient should remain lying on his stomach for a while. He should rest for three or four days.

Intramuscular injections into the *arm muscles* have also been practised.

D P1 Arsenobenzol Suppositories.

Arsenobenzol 0·1 Gm., Cocaine 0·1 Gm., Almond Oil *q.s.*, Theobroma Oil to 1·0 Gm. Not to be kept more than 48 hours. Coat with beeswax as protective.—Pres.

P1 **Supsalvs.**—A proprietary brand of Suppositories containing each 0·1 (adult) and 0·03 Gm. (infants).

Diabetes mellitus successfully treated by Arsenobenzol Suppositories (Supsalvs), also by Novarsenobenzol intravenously.—F. J. W. Porter, L. ii./20,1051.

The Council of Pharmacy and Chemistry of the American Med. Assn. considered that clinical results obtained from rectal administration of Arsphenamine were too feeble compared with intravenous or intramuscular administration to warrant favourable consideration of such treatment in congenital syphilis. "Supsalvs" unfavourably reported on.—Jl. A.M.A. ii./25,630.

Combined Salvarsan and Mercurial Treatment.

Most specialists supplement the Arsenic treatment with Mercurial injections or inunctions.

The necessity of associating intravenous injections of Arsenic with Mercurial treatment was confirmed by the French Military Medical Service on the results of 95,000 injections of Arsenical compounds during the first two years of the war. There was no fatal case and few serious results.—P. Ravaut, Arch. Med. et de Pharm. Militaire, Nov. 1916. See also B.M.J. i./18,482.

The *combined Arsenic and Mercurial treatment of Neisser* consisted in periodic intravenous injections of Salvarsan followed by a course of five intramuscular injections of Grey Oil or 30 inunctions.—**Venereal Diseases Roy. Com. Report,** B.M.J. i./16,346,380, Editorial, 385.

Extra courses of Salvarsan, rather than Mercury, for prevention of Wassermann reactions and destruction of residual spirochætes. Grey Oil courses said to increase tendency to relapses.—Prof. E. E. Glynn, L. ii./26,1075.

Modern aspects of syphilis. Every early primary case with negative Wassermann Reaction should receive 20—25 Salvarsan injections intravenously and some 16—18 of Mercury and Bismuth, or Mercury given *per os.*—W. H. Brown, B.M.J. ii./26,890.

War Office Method (Letter, May 8/16, No. 24/General/4912, A.M.D. 2):—

Course A.—**During 52 days,**

1st week	2 doses	Salvarsan (0·3 Gm.)	and 1 dose of Mercury.
2nd ,,	1 dose	Salvarsan (0·3 Gm.)	, 1 ,, of Mercury.
3rd ,,	1 ,,	Mercury (only).	
4th ,,	1 ,,	Salvarsan (0·4 Gm.)	,, 1 ,, of Mercury.
5th ,,	1 ,,	Salvarsan (0·5 Gm.)	,, 1 ,, of Mercury.
6th ,,	1 ,,	Salvarsan (0·5 Gm.)	,, 1 ,, of Mercury.
7th ,,	1 ,	Salvarsan (0·5 Gm.)	,, 2 doses of Mercury.

(*Recent* evidence is that single doses above 0·4 Gm. are not advised.—W. H. M. *vide infra.*)

If the Wassermann Reaction is still positive—

***Course B.*—14 days on Potassium Iodide in 10 grain doses.**

If still positive—

***Course C.*—Comprised of 11th to 13th week.—3 doses of Mercury; 1·2 Gm. of Salvarsan during 15 days.**

Patients should be persuaded to continue treatment until all clinical signs have disappeared and blood reaction is negative. Primary sores, secondary rashes and condylomata disappear quickly, but in cases in which the mucous membrane of the mouth and tonsils are affected, and in glossitis, the effect is not so speedy.—Maj. Lloyd Jones & Capt. A. J. Gibson, B.M.J. i./17,152.

As a routine treatment for primary and secondary syphilis three injections of 0·6 Gm. in 200 Cc. Saline at fortnightly intervals, with two weekly injections of mercurial cream in the intervals. This course is an intensive one designed to render a soldier fit for active service quickly.—H. C. Lucey, B.M.J. i./16,614.

If doses of 0·6 Gm. Arsenobenzol are repeated too frequently toxic effects are frequent, epileptiform convulsions coming on within 5 days, and often ending fatally. According to a German edict a few years ago a single dose must not exceed 0·4 Gm. Even 8 doses of 0·3 Gm. in 28 days with Mercury is unsatisfactory—*dermatitis and jaundice* follow. Both these are apt to be fatal.

A drink containing *Glucose* 2 ounces, given ½ hour before injection, appears to reduce jaundice. An elaborate table of treatment to be spread over two years, as used at St. Thomas's, comprising either '606,' '914,' Sulfarsenol or Silver Salvarsan, with Mercury and Potassium Iodide, is provided.—Col. L. W. Harrison, B.M.J. ii./22,1.

Local Anæsthetics.

Novocain injection—2 Cc. of 1% Solution has been advised before, and is said to render the injections painless. Ethyl chloride has also been used. Also Morphine in dose of 0·01 Gm. where pain is excessive with subcutaneous injections.

Injectio Salvarsan cum Novocain (Intramuscular).

Dose.—Salvarsan 0·3, Novocain 0·03, Normal Saline to 10 Cc.

This has been employed, but the pain caused may persist after the anæsthetic effect has passed off.—W. H. M.

Local Use.

For condylomata a powder containing Arsenobenzol as also a 50% Ointment strongly caustic when used in this manner and hence curative.

For milder effect a 10% Ointment in a mixture of equal parts Soft Paraffin and Lanolin is used.

Salvarsan in glossitis.—Swabbing with solution of 0·1 Gm. in water 30 minims and Glycerin ½ ounce was curative. At the end of a week ulcers diminished to quarter of original size.—A. Allport, B.M.J. ii./12,349.

Ordinary ulcers heal rapidly by local use of Salvarsan and Neosalvarsan as dusting powder.—H. Alston, B.M.J. ii./12,1748.

Intrathecal Injection of Patient's Serum after Salvarsan Treatment.—The transmission of *Sp. Pallidum* from the brains of general paralytics to the rabbit and the experimental production of syphilitic encephalitis in this animal (Noguchi's experiments), led up to this method.

The entire subject is dealt with in Edn. XVIII., p. 214.

Neuro-syphilis. Defined as comprising only such nervous or mental symptoms as are actually due to the syphilitic organism or its toxin. It does not mean the mere presence of nervous or mental symptoms in a syphilitic patient. The treatment is Salvarsan combined with Mercury, but 0·6 Gm. of the former intravenously is now considered risky. It is safer to give not more than 0·3 Gm. in repeated doses. Salvarsanised serum (patient's own blood), or human, or horse serum, mercurialised *in vitro*, is suited for tabes and cerebro-spinal syphilis. Arsenobenzol given direct intraspinally into the cerebro-spinal fluid is dangerous.—Sir J. Purves-Stewart, B.M.J. ii./22,621. See also S. A. Kinnier Wilson, *ibid.* 628. See also D. K. Adams' 'Treatment of Neuro-syphilis with special reference to changes in the cerebro-spinal fluid.' (Cell counts and Colloidal Gold reaction), *ibid.* 630.

Atropine, Quinine, Lead, Copper, Zinc, and Bismuth pass over in the mammary secretion. From clinical observations the following are added: Iodine, Salicylic Acid, Ether, Mercury, Phenazone, Aspirin, Arsenic, Morphine, Hexamine, Acetanilide, Scopolamine and Luminal. ***Arsenic is found in the milk following Arsenobenzol*** treatment, so that caution is advised.—M. M. W., '26,322, per Pres., Feb. '27,65.

Salvarsan, Mercury, Potassium Iodide and other drugs cannot with certainty destroy *Sp. pallida.*—H. C. French, L. ii./12,228.

Streptococci in serum are killed by Salvarsan and Neo-Salvarsan in high dilution.—Sir A. E. Wright, L. ii./15,1012.

"Salvarsan," by M. and W., provides abstracts of the literature of the subject ranging from March 15 to December 17, 1910. These constitute everything of importance that was written on the subject up to that date. Further references are contained in the 15th—18th Editions.

After-effects.

Among after effects have been observed:—Headache, numbness of the limbs, sickness, skin eruptions—urticaria, acute dermatitis, erythema, and jaundice. Effects on the eye: iritis. (A person with unsound eyes must not receive the injection.) Pyrexia; sensory nerve complications; defects in hearing have been reported.

Arsenic retention (especially with the intramuscular method) has resulted in death—*vide Vol. II.*

Two fatal cases of icterus gravis following Novarsenobillon.—B.M.J.i./18, 448.

Jaundice. 115 cases in 7,000 patients.—Col. Bolam, B.M.J. i./19,489. Evidence is that the arsenical is conducive. It is more common with 'Neo' than with the original.—R. Hallam, L. i./20,1356. See also A. T. Todd, L. i./21,632.

Delayed Arsenical poisoning from Arsenobenzol preparations. A report of 58 cases during last 18 months—8 fatal.—G. S. Strathey and co-workers, L. i./20,802.

Acute angio-neurotic œdema due to.—R. F. G. Parnell, W. C. P. White and P. Fildes, L. ii./17,866.

Calcium Chloride 10% solution in Salvarsan Poisoning given separately or with the injection prevents toxic symptoms.—B.M.J.E. i./22,94.

Risks of Arsenobenzol injections—Medical Research Council Report. Some degree of hepatic insufficiency demonstrable 3 months after a course—but the treatment thought justifiable.—L. ii./22,193.

DISADVANTAGES OF SALVARSAN TREATMENT.

Dr. Dreuw, a Berlin specialist, gives the following statistics: (1) 84% of 8,000 soldiers so treated were not cured, (2) 13 practitioners report 101 fatal cases of Salvarsan poisoning in 1 year, (3) for every 100,000 persons treated with Salvarsan there were 620 with consequent skin complications, 1·3 cases blindness, 2·6 cases complete, and 4 partial, deafness, 62·2 cases of cerebral involvement, 224 of paralysis, and 16·2 deaths undoubtedly and 14·2 deaths probably due to Salvarsan.—B.M.J. i./24,441.

Treatment of Toxic Effects due to Arsenobenzol.

Severe vasomotor disturbance: Adrenalin Chloride 1:1000, 10—15 m. subcutaneously.

Cerebral symptoms with severe epileptiform convulsions: lumbar puncture, 20—30 Cc. fluid being withdrawn.

Erythema: Alkaline Glucose Solution (25%), 25 Cc. intravenously, daily or every other day as required. Sodium Thiosulphate 0·6—0·9 Gm. intravenously, every day or every other day, also effective.

Exfoliative dermatitis: same treatment as erythema so long as bend of elbow not involved: diet as for typhoid fever. Injections not repeated for at least a year after recovery.

Jaundice: Glucose intravenously, and diet as for dermatitis. Bowels kept open and mixture containing Bismuth and Sodium Bicarbonate given. —L. W. Harrison, Pres., Sept. '26,323.

Atropine 1/50 grain hypodermically is also advised for immediate vasomotor reactions. The cardiac reactions are best treated with hypodermic injections of Strychnine 1/32 grain, Ether 30 minims, or Camphor 1½ grains. Later reactions, *e.g.*, stomatitis, affections of the central nervous system, liver complications and skin reactions, may be treated with Sodium Thiosulphate or Thiosinamin.—P. Power, Jl. R.A.M.C., Jan., '27,46.

Daily intravenous injections of Sodium Thiosulphate recommended when Salvarsan poisoning threatens. Has never failed and no ill effects have been observed from it.—B.M.J.E., i./27,93.

Warnings and Contra-indications.

It should not be given to aged and infirm patients.

Idiosyncrasy to Arsenic in general may exist **in the patient.** If necessary, try the effects of Fowler's Solution *per os.* Patients giving a positive reaction should not receive the injection.

If the injection be given on a full stomach or when blood pressure is high an alarming condition of feeble rapid pulse and collapse may supervene, which, however, usually passes off when vomiting occurs. A good purging night before and morning of the injection is advisable and no food or drink for some four hours before the infusion.—H. W. Bayly.—L. i./11, 153.

It is certain the drug can cause death. It is very unwise to inject a total of 1·2 *Gm.* (2 doses of 0·6 Gm.) within three days—a wider interval is important. Selection of case probably essential in the future.—L. i./12, 592.

The drug should not be given where there is a general exhaustion of vitality following the severity of the syphilitic poisoning, especially in persons already suffering from chronic organic diseases of the kidneys and from chronic degenerations of the cardiac muscle, patients with definite atheroma of the arterial coats, such as have already suffered from anginal attacks or from signs of cerebral hæmorrhage, add to these, patients with diabetes, tabes dorsalis and general paretics, and lastly any case in which there is or has been recent endocarditis. Extreme caution is necessary in cases with signs of active pulmonary phthisis, owing to the congestive action of the drug.—B.M.J.E. ii./13,7. (According to some authors, nephritis is *not* a contra-indication.)

Wassermann's Reaction, Effect on and other details. *See Vol. II.*

P1 **Salvarsan Sodium,** P.G. VI. ('1026A' Ehrlich). *Dose,* 0·3 to 0·45 Gm. As much as 1 Gm. has been given. A yellow powder readily soluble in water (requires no alkali to dissolve it).—B.M.J. i./15,979.

Sodium Salvarsan seems, in its efficacy, to be between 'modern' 606 and 914.—Col. L. W. Harrison, B.M.J. ii./21,944.

P1 * **Eparseno** "132" (T.M. 422653) is stated to be a stabilised solution of Arsenobenzol for painless injection (it is *only* to be used this way) in the treatment of syphilis, yaws, recurrent fever, etc. It is supplied in ampoules each containing 1 Cc. of solution, corresponding to 0·12 Gm. of Arsenobenzol or 0·25 Gm. of Novarsenobillon.

P1 * **Stabilarsan** (Brit. Pat. 177283 of 1922, T.M. 411118.) A preparation of Arsenobenzol base with Glucose for injection, supplied in liquid form ready for use, either intravenously or intramuscularly, in ampoules.

Stabilarsan is based on the theory that a molecule of Arsenobenzol combines with two molecules of Glucose to form a definite chemical compound. This compound is stated to be relatively stable when exposed to the air. It is supplied in 50% Glucose solution. *Ampoules* contain 0·1, 0·15, 0·20, 0·30, 0·45, 0·6, 0·75 and 0·9 Gm.

In congenital syphilis the preparation is stated to be safe. For an infant 15 lbs. weight dose 0·075 Gm. (0·75 Cc. of the solution in the ampoule). For routine treatment of syphilis a course is given combined with Potassium Iodide on the lines of Arsenobenzol methods.

P1 ✱**Sanogyl** (T.M. 421128). A tooth-paste to combat pyorrhœa; claimed to have a specific action on spirilla of the mouth, and to contain arsenobenzol. —P.J. ii./22,392.

We identified the presence of arsenic by the Marsh Test. There is insufficient to give a precipitate with H_2S after destroying organic matter.

P1 Silver Salvarsan. P.G. VI.

Dose.—Strictly intravenously, one or two injections of 0·1 Gm. each, proceeding to full doses of 0·2 Gm. for women and 0·25 Gm. for men at intervals of not less than 4 days. The latter are repeated at similar intervals until clinical symptoms are cured and Wassermann Reaction negative. In weakly patients begin with 0·05 or 0·075 Gm. Injections are 1% in sterile water, *e.g.* 0·1 Gm. in 10 Cc.

Manufacture.—Stated to be made by interaction of a silver salt with Arsenobenzol and conversion of the resulting body into the Di-sodium salt, containing 22·5% Arsenic and 14% Silver.

It is a brownish black powder, readily soluble in water, with alkaline reaction. Ampoules contain 0·05, 0·1, 0·15, 0·2, 0·25 and 0·3 Gm.

Clinically 0·1 Gm. corresponds to about 0·3 Gm. Novarsenobenzol. It is thought to have the combined effect of Arsenobenzol and Silver against syphilitic parasites. Mercury to be suspended during treatment.

Contraindications.—Cardiac diseases, diseases of the liver and kidneys, and constitutional tendency to skin diseases.

SYPHILIS.—Efficient with pronounced effect on visible syphilis lesions. Absence of characteristic and often nauseating garlic-like odour noticed by patients receiving Salvarsan intravenously—no authentic case of argyria reported.—H. E. Michelson and D. M. Siperstein, L. ii./21,571. See also B.M.J.E. ii./21,1,54.

Effective in early cases, comparatively inert in late.—Pres. July, 20,274.

Probably about twice as effective as '914' in similar doses.—Col. L. W. Harrison, B.M.J. ii./21,944.

Late syphilis. Importance of thorough treatment in the first instance—to prevent late sequelæ. Sulfarsenol praised for use in myocarditis and aneurism. Tabes: Intravenous injections with deep subcutaneous injections. For intravenous use Silver Salvarsan and for subcutaneous Sulfarsenol. G.P.I.: Silver Salvarsan in large quantities.—Col. L. W. Harrison, L. i./23,4.

Contains Silver Oxide in complex form. It does not contain Colloidal Silver.—J.C.S.A. i./20,401.

The Silver is not combined with the Salvarsan in P1 **Sodium-Silver Salvarsan** (another preparation) but is present merely in colloidal form.—W. H. Gray, P.J. i./23,216.

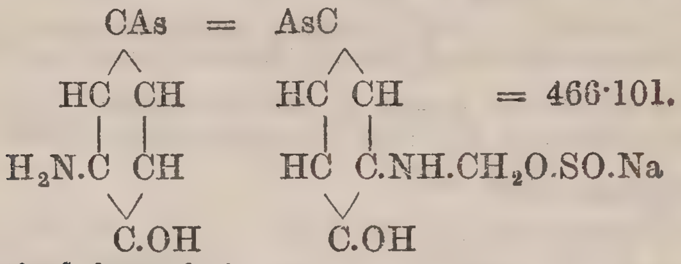
Silver Arsenobenzol inferior to Arsenobenzol and Novarsenobenzol in treatment of syphilis.—A. Strauss and co-workers, per Jl. Trop. Med., April 15/22,106.

In *multiple sclerosis* Silver Salvarsan the most effective remedy—0·05 Gm. twice weekly, increased to 0·15 or 0·2 Gm., the average total dose being 2·5 Gm.—B.M.J.E. ii./24,55; Jl. Trop. Med., Apl. 15, '25,168.

P1 **Neo-Silver Salvarsan, P.G. VI.**

A molecular compound of Neosalvarsan and Silver Salvarsan in brown powder.

F 1 **Novarsenobenzene.** *Syn.* NOVARSENOBENZOL, NEO-ARSENPHENOLAMINE, ✱NEO-KHARSIVAN (T.M. 364607), ✱**Neosalvarsan*** (No. 914 of Ehrlich's Series), ✱NOVARSENOBILLON (T.M. 413810), ✱KHARSULPHAN (T.M. 445499), NOVARSENOL, ARSENOBENZOL ACID SODIUM FORMALDEHYDE-SULPHOXYLATE, SODIUM DIOXYDIAMIDO-ARSENOBENZENE-METHANE SULPHONATE. P. Argent. II., P.G. VI., NEOARSPHENAMINA, U.S. X., NEOARSAMINOL, P.Svec.



(Theoretical formula.)

Brit. Patent No 7865/12. Aqueous Solutions of Salvarsan and Formaldehyde Sulphoxylate give a precipitate which is soluble in a minute quantity of alkali to form an almost Neutral Solution. The product differs according to temperature employed. At ordinary temperature the precipitate contains one "Sulphur-Acid" group, at 60–70° it contains two "Sulphur-Acid" groups. See also Patent No. 8219/12. Licences to use these patents have been granted. See Arsenobenzol.

The soluble compound may be made directly from Sodium Formaldehyde Sulphinite, *Syn.* Rongalite.—G. Malcolm Dyson, P.J. i./26,32.

Novarsenobenzene under the THERAPEUTIC SUBSTANCES ACT, 1925, and the S.R. & O., 1927, No. 486, is now made under license (*cf.* Arsenobenzene) and assayed biologically.

It is a yellow powder, readily soluble in water. The compound changes in the air; it is hence issued in sealed ampoules. The dry powder as taken from the sealed ampoules must contain not less than 18% or more than 21% of Arsenic. U.S. X. says not less than 19%. *Injections must be made immediately after preparation.*

Strength in comparison with Arsenobenzol.—It is 2/3 the strength.

Dose and Method of Use.—

Average single for men 0·6 to 0·9 Gm. (=0·4 to 0·6 Gm. of Arsenobenzol).

For women, 0·45 to 0·75 Gm. (= 0·3 to 0·5 Gm. of Arsenobenzol).

For children, according to age, 0·15 to 0·3 Gm. (= 0·1 to 0·2 Gm. of Arsenobenzol).

For infants, 0·05 Gm. (= 0·03 Gm. of Arsenobenzol).

Caution.*—Some of the recommendations by authorities latterly have been on the side of reducing single doses, vide remarks under Arsenobenzol. We repeat these average figures with this proviso.*

Intramuscularly smaller doses suffice—0·45 Gm. is regarded as maximum by this route, vide infra.

Speaking generally, the dosage for this compound is identical with that of Arsenobenzol and for guide as to repetition of dose and course of treatment, the remarks under that heading apply.

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*Trade Mark No. 340387 was suspended in favour of British Houses, but uspension *revoked* (1923), *cf.* Arsenobenzol.

The doses are given by the following procedures:—

INTRAVENOUS. *Concentrated,* 0·6 Gm. (average) in 10 Cc. sterile distilled water (not saline).

Dilute, 0·6 Gm. in 100 to 120 Cc. water; or for 0·3 or 0·45 Gm. in 40 to 50 Cc. water (not saline).

INTRAMUSCULAR. The absorption is slower, so it is probable that smaller doses suffice than by the intravenous method.

0·45 Gm. may be regarded as the maximum. This should be dissolved in a mixture of **Guaiacol-Glucose** and water 10 to 20 minims, for injection into the buttock. The part should be massaged after injection. It is not given subcutaneously.

Guaiacol-Glucose Sterules 2 Cc. for preparing the intramuscular injection are made of the strength, Guaiacol 1, Glucose 50, Sterile Water to 100.

This method of procedure was advocated by T. Anwyl-Davies, L. ii./18,757. It was found painless. Even 0·75 Gm. will dissolve in 10 to 20 minims.

P1 * Glucarsenol (T.M. 382195) is a solution in Glucose, Guaiacol and Water with addition of Stovaine. The Glucose may, to some extent, prevent oxidation.—L. ii./18,96.

Uses.—As for Arsenobenzol. It is said to be better tolerated.

For contraindications and treatment of after-effects see Arsenobenzol.

References.

PUERPERAL FEVER.—Remarkable improvement following use of Novarsenobillon in puerperal sepsis—better than blood transfusion.—H. J. Phillips, B.M.J. ii./25,1125.

Good results by Novarsenobenzol, intravenously or subcutaneously, 0·1 Gm., rising to 0·15 Gm. (not higher), the fever being controlled. It is usual to allow a day to elapse between the first and second injections, and then after an interval of one day injections are given on two successive days. This salt, and Sulfarsenol, were shown to have a strong bactericidal action on streptococci, and can be used prophylactically where infection is suspected. Contraindicated in serious hepatic trouble, uræmia, cancer, and chronic bacterial infections.—L. ii./25,28.

SYPHILIS.—*Subcutaneously* Novarsenobillon influences syphilitic lesions *more rapidly than intravenous doses of* Salvarsan or Arsenobillon. Experience of 1,500 subcutaneous or intramuscular injections of Neo-Salvarsan. Numerous methods were tried and are described, the best being to dissolve the Neo-(0·6 Gm.) in 1 Cc. of a 4% Stovaine solution and make up to 2 Cc., with a **Creo-Camph Cream** melting at 15° C. which is stated to be a 'special' formula. **Campho-Phenique**, instead of Creo-Camph., also used with encouraging result. Morphine ⅓ grain is required to overcome pain. The injection is made about a point three finger breadths below the crest of the ileum on a line joining the tuber ischii with a point on the crest of the ileum which is perpendicularly above the great trochanter when the patient is upright—L. W. Harrison, C. F. White and C. H. Mills.—B.M.J. i./17,569

In syphilis of the central nervous system Novarsenobillon ('914') safe and most efficient.—H Carlill, L. i./18,243.

Intravenous use in syphilis. Course of 6·15 Gm. spread over 80 days with Mercurial Cream in addition.—H. W. Abbot, L. i./18,307.

Severe dermatitis from Novarsenobillon.—L. G. Leonard, B.M.J. ii./19,773.

Gastric syphilis treated by Mercury and Arsenobenzol.—D. J. Galloway, B.M.J. i./22,217.

Soft chancres treated by swabbing with 3% solution.—B.M.J.E. ii./22,18.

Glucose, 30 Cc. of 30% solution, given intravenously in conjunction with even small dose of Neosalvarsan increases efficacy.—B.M.J.E. i./22,17.

ANTE-NATAL TREATMENT OF CONGENITAL SYPHILIS. The focus of infec ing spirochætes is probably the placental tissue. Arsenical compounds an Mercury at Glasgow given with 100% successes.—J. R. C. Greenlees, B.M.. ii./21,654.

Four or five intravenous injections of Neosalvarsan with Mercurial i unctions during pregnancy. Results good. A resolution for notificatio —B.M.J. ii./21,654,887.

INTRAPERITONEAL INJECTION in infants suffering from congenital syphil with safety. A child of 10 lbs. should receive 50 mgm., or 5 Cc. of a solutio consisting of 150 mgm. of Neo-arsphenamin dissolved in 15 Cc. warm steril water. The usual treatment consists of four injections at three-day intervals followed by 4 injections at seven-day intervals, the ideal site for entranc of the needle being in the middle of the left rectus sheath, slightly below th level of the umbilicus. The method is not as rapid as intravenous injections but Neo-arsphenamin is absorbed with sufficient rapidity to act in an condition. It is ideal for children with small veins needing urgent treat ment.—H. S. Sanford, Jl. A.M.A. ii./25,242—245.

Fewer injections of Neoarsphenamine required in the treatment of syphili when combined with milk injections.—B.M.J.E. i./26,30.

Cardio-aortic syphilis treated by, each year, a series of 6 to 8 intravenou injections of Novarsenobillon 0·6 Gm. at weekly intervals.—T. F. Cotton B.M.J. i./26,855.

Spirochetal pulmonary gangrene well treated with Neoarsphenamin intra venously.—B. S. Kline and S. S. Berger, Jl. A.M.A. ii./25,1452.

DISSEMINATED SCLEROSIS, early cases treated with Novarsenobillon. Si weekly intravenous injections (0·15, 0·3, 0·45, 0·45, 0·6, 0·6 Gm.) repeate at end of six months, with Arsenic *per os* in the interval.—W. Johnson L. i./23,1209.

Sodium Thiosulphate simultaneously with "914" might protect the spirochæte, as well as patient's tissues. It was found, however, that it had no deleterious effect on therapeutic action.—L. W. Harrison, H. H. Dale and P. A. Clements, L. i./25,1161.

TRYPANOSOMIASIS.—Intravenous injection of Arsenical compounds, and an immediate subsequent attempt to sterilise the central nervous system by intrathecal injection of Salvarsanised Serum. The patient's treatment is complete in 2 days. Comparative tables of a variety of procedures. A dose of Neo-Kharsivan with 1 injection intrathecal serum gave a large percentage 'alive and well.'—C. H. Marshall and S. M. Vassallo (Uganda), B.M.J. i./21,773; i./23,231.

In trypanosomiasis, drugs injected into the circulation, though they may sterilise the blood, probably do not reach the parasites in the central nervous system as the trypanosomes damage the choroid plexus and so prevent passage of drugs into the cerebo-spinal fluid. Neo-Kharsivan injected into a vein and 3 hours later withdraw 3 ounces of the patient's blood. 20 minims of the serum is then injected into the spinal canal. Results so far (since 1918) promising. —Sir T. Clifford Allbutt quoting Marshall of Uganda, B.M.J. ii./21,181.

Marshall and Vassallo produced no satisfactory evidence that intrathecal injections of Salvarsanised Serum sterilise infected cerebro-spinal fluids (in trypanosomiasis).—Prof. Warrington Yorke, L. ii./21,973,1077.

Death 111 days after the last of seven injections of a course of Neosalvarsan treatment.—D. R. C. Shepherd, L. ii./21,1273. A rough estimate of the Arsenic in the body *post mortem*, by Maj. Elliott, showed that nearly one-tenth of the total Arsenic given remained in the body.

Cysts of *Giardia intestinalis*, *Chilomastix mesnili*, *E. Coli*, *E. histolytica*, and *E. nana* rapidly disappeared from stools of a man, following intravenous injections of Neo-arsphenamin. Whether results were permanent has yet to be determined.—Carr and Chandler, T.D.B. Vol. 17, 1921,99.

MALARIA treated with conflicting results. Sodium Cacodylate recommended as an adjuvant to Quinine.—W. A. Murray, T.D.B. Vol. 17, 1921,142.

In early cases of simple tertian malaria an injection is a therapia magna sterilisans.—Jl. Trop. Med., Aug. '15,308; Jl. A.M.A. ii./25,151.

BRONCHO-SPIROCHÆTOSIS in China. Immediate relief; recovery after second or third administration.—E. C. Faust, Jl. Trop. M., Jan. 1/23,14.

GUINEA-WORM.—Novarsenobillon, 0·6 Gm., is the best treatment.—N Cantlie, Jl. Trop. Med., Feb. 1/23,39.

Massive doses given *intrarectally* in cases where intravenous injections are dangerous or undesirable. As much as 4 Gm., it is stated, may be given with safety.—H. G. Mehrtens, per Jl. Trop. Med., Nov. 1/22,348.

HEMIPLEGIA cured in 3 weeks by intravenous injections of 0·3 to 0·9 Gm. —L. Le Dentu, per Jl. Trop. Med., Oct. 1/23,312.

AMŒBIASIS has been treated with it *per os* in France.—L. ii./26,824.

RAT-BITE FEVER, a case of in India, treated by 0·7 Gm. of Neosalvarsan, subsequently by Metharsinate of Soda *per os*. Hata mentions 8 cases. Treatment in other cases—Methylene Blue, Quinine, Arsenic, Mercury and Salol dissolved in Olive Oil for the roseolar eruption.—L. ii./13,1764.

TYPHUS FEVER treated intravenously. In two cases the course of the disease was aborted.—Glas. Med. Jl., Nov. 1913,376.

TUBERCULOSIS.—Organic compounds of Arsenic, *e.g.* '914' (intravenously) and Sulfarsenol (intramuscularly) in pulmonary tuberculosis where Arsenic seems indicated—intramuscular route preferable. Improvement due to stimulation of the metabolic functions; there is no specific effect upon the bacilli.—J. Guy and G. B. Page, L. i./24,847.

Blood pressure is generally lowered by Neosalvarsan intravenously; it is certainly not increased.—H. D. Rolleston, B.M.J. ii./15,281.

LEUCOCYTOSIS is induced powerfully by Novarsenobenzol (0·3 to 0·6 Gm. intravenously); useful in trachoma and staphylococcal infections (see also Mercury Salicylate).—G. R. S. Thomas, L. i./25,1292.

YAWS, acute, generally cured within 3 days by one injection of Novarsenobillon or Galyl.—F. T. Auden, B.M.J. ii./22,83.

In Western Samoa, the standard treatment for yaws is three doses intravenously at one-week intervals.—Per Jl. Trop. Med., Apl. 1/'26,27 (Col-Med. Rep. No. 191).

$\boxed{\text{P1}}$**Novarsenobenzol Suppositories** (0·10 Gm. in cocoa butter) given to three months' old baby with hereditary syphilis, with good results.—E. G. Melon, per Jl. Trop. Med., Oct. 16/22,334.

$\boxed{\text{P1}}$ **Sulpharsenobenzene.** *Syn.* SULPHARSPHENAMINE, SULFARSENOL, DI-SODIUM DIOXY-DIAMINO-ARSENOBENZENE-METHYLENE SULPHONATE.

$NaOSO_2.CH_2.NH.OH.C_6H_3.As : As.C_6H_3OH.NH.CH_2.O_2SONa.$

This compound, of which the 'proper name' under the **Therapeutic Substances Act, 1925**, and S.R. & O. No. 486, 1927, is **Sulpharsenobenzene,** is a yellow dry powder soluble in water without gelatinous particles visible in the solution. It must comply with tests for toxicity, therapeutic potency and stability detailed in the S.R. & O.

Dose.—The preparation can be given *hypodermically* or *intramuscularly* in fairly concentrated condition. The following is suggested as a course in primary syphilis for an average adult :—

		Water.
1st day	0·12 to 0·18 Gm.	in 2 to 3 Cc.
3rd ,,	0·18 ,, 0.3 Gm.	,, 3 ,, 5 ,,
5th ,,	0·30 ,, 0.42 Gm.	,, 5 ,, 7 ,,
8th ,,	0·42 ,, 0.6 Gm.	,, 7 ,, 10 ,,
13th ,,	0·48 ,, 0.6 Gm.	,, 8 ,, 10 ,,
19th day	0·54 to 0·6 Gm.	in 8 to 10 Cc.
25th ,,	0·6 Gm.	,, 10 ,,
40th ,,	and later, Wasserman	
40th to 60th day,	Arrhenal.	
61st day,	New Series of injections of Sulfarsenol.	

The preparation is also given intravenously, starting with 0·06 Gm., proceeding with caution (see also Col. L. W. Harrison, *infra*).

The preparation is supplied commercially in a range of doses.

It is stated that this is the only Arsenobenzol compound on the market, which can be given into the muscles or subcutaneous tissue without causing great pain. Intramuscular or subcutaneous treatment of syphilis with Arsenobenzol preparations in general said to be better than intravenous.—F. C. Doble, L. ii./20,243. Also used in complications of gonorrhœa, arthritis, rheumatism, hyperkeratosis and epididimytis (especially good in the last mentioned).—L. i./23,70. See also W. M. Browdy, *ibid.* 158. (Doble uses only 8 to 10 minims of water for 0·2 to 0·6 Gm. injected into the forearm.)

Intramuscularly or subcutaneously in doses as high as 0·6 Gm. in 33% solution, without significant local reaction. End results favourable. Intramuscular injection the method of choice. Relatively high incidence of dermatitis, especially with intravenous injections. In congenital syphilis, as effective as Neoarsphenamin.—Am. Jl. Syph., per Jl. A.M.A. ii./25,1088.

Congenital syphilis treated. Its intramuscular injection not so efficacious as Kharsivan intravenously.—E. Crawford and G. B. Fleming, L. ii./21,700.

Good results from Sulfarsenol. It can *not* be recommended for intravenous use. Given subcutaneously, it offers a hope of treating syphilis over long periods without toxic effects.—Col. L. W. Harrison, B.M.J. ii./21,944.

After 3 injections of the drug in the treatment of yaws in a child of 6 an eruption of herpes zoster appeared—possibly due to the Arsenic.—H. Coppin, per Jl. Trop. Med., May 1/23,140.

GONORRHŒAL ARTHRITIS. It is said to 'act like a charm.'—*Dose,* 0·12 Gm. followed in 2 days by 0·18 Gm. intravenously; three injections usually sufficient.—F. C. Doble, L. i./23,1315.

PUERPERAL SEPTICÆMIA well treated subcutaneously, in doses of 0·12 Gm. In some cases 5 or 6 injections (at one-day intervals) of 0·18 Gm. were needed. Intravenously may be preferred in grave cases of septicæmia.—Paris Med., per Jl. A.M.A. ii./25,393.

Good results with Sulpharsenol, 0·06 Gm. to 0·12 Gm., given similarly to Novarsenobenzol in puerperal fever (see abst. p. 205).—L. ii./25,28.

Based on trypanocidal tests, Sulpharsphenamine is considerably inferior to Arsphenamine, and only half as efficient as Neoarsphenamine.—per Jl. Trop. Med., May 15/'25,200.

Dangers of Sulpharsenobenzol injections.—B.M.J.E. ii./26,92.

𝔓1 Sulphoxyl-Salvarsan. P.G. VI.

SODIUM *p*-ARSENOPHENYL-DIMETHYLAMINOPYRAZOLON-METHYLENESULPHOXYLATE,

$$C_{33}H_{25}O_4N_6As_2S.Na = 774{\cdot}229.$$

Dose.—8 to 12 Cc. intravenously at 2 to 3-weekly intervals. It occurs in commerce only in isotonic solution containing 5% of the Arsenic compound and 12% Lactose. Decomposition occurs on exposure of the solution to light and air.

Used in paralysis, frambœsia, syphilis and tertiary malaria.

𝔓1 Sodii Benzo-sulpho-*p*-aminophenylarsonas. *Syn* HECTINE.

$$C_6H_5.SO_2.NH.C_6H_4.As : O.OH.ONa = 379.117.$$

Ampoules 'A' contain 0·1 Gm. in 1 Cc.—for 15 to 30 daily intragluteal injections. Ampoules 'B' contain 0·2 Gm. in 1 Cc. for more advanced cases. **Pills** contain 0·1 Gm. One or two daily for 10 days. **Drops.**—20 drops contain 0·05 Gm. *Dose.*—20 drops a day, during the first 4 days; 40 to 100 drops daily, during the following 10 days.

Colourless needles containing 19·75% Arsenic approximately. Very soluble in water. Solutions can be sterilised without decomposing.

Good results in primary, secondary, and hereditary forms of syphilis have been reported. Cases should finally receive Mercury and Iodide.

𝔓1 **Hectargyre.** A preparation described as a mercurial salt of Hectine for reatment of syphilis. Stated to be more rapid than any other mercurial agent. 𝔓1 **Ampoules** 'A' contain Hectine 0·1 Gm., Mercury oxycyanide 0·01 Gm. in 1 Cc. 'B' contain Hectine 0·2 Gm., Mercury Oxycyanide 0·015 Gm. in 1 Cc.—one to be injected daily intramuscularly or intravenously, not subcutaneously. 𝔈 𝔓1 **Pills** contain Hectine 0·1 Gm., Protoiodide of Mercury 0·01 Gm. and Opium Extract 0·01 Gm. *Dose.*—2 pills daily for 12 *to* 15 *days*, 10 to 15 comprising the course.

𝔓1 **Kinectine.** A compound of Hectine with Quinine—*i.e.*, Benzo-sulphon-para-amino-phenyl-arsenate of Quinine. *Tablets* are made. Dose.—Three daily, one in the morning and two at night. *Use.*—As a prophylactic against and curative of hay fever, influenza and acute coryza.

P1 ***p*** **- Amino - phenylarsonic - Toluene - Sulphonate,** $C_6H_4CH_3(p)SO_2NH.C_6H_4AsO_3H_2$ is analogous with the acid of Hectine. Morgan and Mickelthwait made it by the Schotten and Baumann reaction by condensing *p*-Toluene Sulphone Chloride with Sodium Arsanilate It should have properties analogous with Hectine

P1 **Tryparsamide.** SODIUM-*n*-PHENYL-GLYCINAMIDE-*p*-ARSONATE.

$H_2N.CO.CH_2.NH(C_6H_4)As.ONa : O.OH = 296{\cdot}053.$

Dose.—1 to 2 Gm. by injection, weekly.

A derivative of Atoxyl, having *pentavalent* Arsenic in its molecule, with low toxicity for animals—*e.g.*, the minimal lethal dose for mice on intravenous injection was over 2 Gm. per kilo, which is about 1/20 the toxicity of Salvarsan. Sleeping sickness cases have been treated with it—about 2 Gm. was found to be efficient and safe intravenous dose, although as high as 7 Gm. were given.—Jacobs and Heidelberger; Brown and Pearce, B.M.J. ii./22, 1183. See also Miss Pearce, Jl. Trop. Med., Feb. 15/23,70.

NEUROSYPHILIS treated. General condition of patients improved—sense of well-being.—D. Lees, B.M.J. ii./25,14.

Marked serologic improvement in majority of cases of all types of neurosyphilis treated. 50 or more injections are usually required over a period of a year or longer. Very untoward symptoms.—H. C. Solomon and H. R. Viets, Jl. A.M.A. ii./25,331.

Tryparsamide does not possess an unusual power of penetration into the central nervous system.—Am. Jl. Syph., per Jl. A.M.A. ii./25,1088.

Neurosyphilis treated intravenously, and in some cases subcutaneously, in weekly doses of 3 Gm. in 10 Cc. water over a period of 8 or 10 weeks. At the same time Mercury Salicylate given intramuscularly in 1 grain doses. Reactions both early and late appear to have been considerable, including visual disturbance in 20% of cases. There was a good effect on nutrition.—J. D. Silverston, L. ii./26,693.

Neurosyphilis treated with Tryparsamide. A first course of 8 weekly injections of 2 to 5 Gm., combined with spinal drainage, followed by a second course, six months later, exactly as the first, except that after the spinal drainage 30 Cc. of a 30% sterile Sodium Chloride solution is given intravenously. Improvement mostly symptomatic. Ocular effects occasionally caused, but not more often than with other Arsenicals. Has little or no effect on the serologic reactions in general paralysis, and is of use in tabes. —J. M. Wolfsohn and C. Leiva, Jl. A.M.A. ii./25,495—6.

Tryparsamide may be given, with safety to the optic nerve, provided patient is watched.—J. H. Roth, per Pres., Sept. '26,336.

In neurosyphilis, striking beneficial results in paresis.—Jl. Ph. & Exp. Ther., Oct. '26,80.

GENERAL PARALYSIS AND TABES.—In 20 cases treated at Maudsley Hospital no remarkable results were obtained. Similar improvements might have been obtained with other Arsenical compounds.—W. S. Dawson, L. i./25, 1072.

In general paralysis, particularly megalomanic forms, the prolonged use of Tryparsamide is at least worthy of trial. Of 13 cases only 2 failed to benefit. 1 to 2 Gm. doses given at weekly intervals intravenously.—M. Brown and A. R. Martin, L. ii./26,699.

TRYPANOSOMIASIS. 40 cases in the Belgian Congo treated with it. A course of eight weekly intravenous injections was given, each injection in a solution made with boiled rain water of a concentration equal to 3 Gm. in 10 Cc. The dose should not exceed 4 Gm. a week. Removes trypanosomes from the cell content of even the most advanced cases.—C. C. Chesterman, B.M.J. i./23,149.

Dr. Louise Pearce writes that it is incorrect to state (as Marshall and Vassallo had) that she had advocated local or intrathecal injection of the compound in sleeping sickness.—B.M.J. i./23,883.

African sleeping sickness can be cured. The dose of 4 Gm. should never be exceeded and the maximum tolerated dose should be arrived at gradually and must be maintained for at least 10 injections, which can be weekly or fortnightly. Adults receiving less than 0·05 Gm. per kilo will relapse, and children can stand double this amount, *i.e.*, 0·1 Gm. per kilo. If toxic amblyopia develops, substitute Tartar Emetic for three weeks—Sodium

Thiosulphate injected is apparently ineffective in preventing amblyopia.—C. C. Chesterman, L. ii./25,965.

Tryparsamide gives considerably better results than Bayer '205' in trypanosomiasis and neither shows any superiority over intrathecal injection of Salvarsanised serum.—C. H. Marshall and S. M. Vassallo, Mar. 15/'26,88.

Tryparsamide cleared the blood in infections with *T. gambiense* in from 6 to 12 hours in doses of 1 to 5 Gm. intravenously. Dimness of vision the only untoward symptom.—P. Manson-Bahr, L. i./27,132.

Amphoteric Arsenical Compounds, *i.e.*, those containing both basic and acidic groups, are more frequently trypanocidal than the non-amphoteric.—King and Co-workers, mentioned by Francis N. Carr, Pres. Address, Soc. Chem. Industry, 1927.

For a Table showing Formula, Arsenic Content and Solubility of most of the Arsenic Compounds dealt with in the preceding pages, see Vol. II.

W. H. Martindale's paper on Organic Arsenic to the Int. Cong., 1909, *see Vol. II.*

$\boxed{P1}$ATROPINA (*B.P.* '14). Fr. Cx., U.S. X.

$C_{17}H_{23}NO_3$=289·192.

$\boxed{P1}$ '*Atropine and its Salts and their preparations.*'—See Note to Guttæ Atropinæ Sulphatis.

Dose.—$\frac{1}{200}$ to $\frac{1}{100}$ grain **(0·0003 to 0·0006 Gm.)**, increased to $\frac{1}{16}$, or in acute mania to $\frac{1}{8}$ grain or more. Fr. Cx.—*Maximum dose* in 24 hours 0·001 Gm. ($\frac{1}{64}$ grain) approx.—is generally given internally as sulphate.

An alkaloid obtained from *Atropa Belladonna*, and other solanaceous plants. Generally in acicular crystals, alkaline in reaction.

Soluble.—1 in 560 of water, 1 in 3 of 90% alcohol, 1 in 36 of ether (Fr. Cx. 1 in 25), 1 in 1 of chloroform, 1 in 40 of olive oil, freely soluble in glycerin and oleic acid. Melts (*B.P.* '14) at 114·5° to 115·5° C. Presence of hyoscyamine lowers M. pt.

Incompatible with caustic alkalis and mercurial salts.

Solutions of Atropine Salts left for several hours with Ammonia or Alkali Carbonate and to some extent Bicarbonate, are liable to saponification, forming tropine and tropate.—D. B. Dott, P.J. ii./21,286.

The mydriatic alkaloids, Atropine and Hyoscyamine may be manufactured from *Atropa Belladonna, Datura Stramonium, Duboisia myoporoides* and *Hyoscyamus niger*, and Hyoscine may be obtained from the last two plants. Atropine does not exist as such to any great extent in these plants, but is produced from the Hyoscyamine (its isomer) by the action of Alkali which is used in the manufacture.

Egyptian Henbane, which is available in large quantities, is a fruitful source of the alkaloid.

By the action of baryta water both Atropine and Hyoscyamine split up into Tropic Acid and Tropine; it is, in fact, **Tropyl Tropate.**

Atropine is to all intents an intimate mechanical mixture of *d.*-and *l.* hyoscyamines which differ in physiological effect. The purest Atropine contains these two constituents in almost precisely equal quantities. This is not the case in the solanaceous alkaloids. Cushny showed that 0·045 mgr. *l.*-Hyoscyamine had the same optic effect as 0·55 mgr. of *d.*-Hyoscyamine, hence the variety *l.* has 12 times the strength of the latter. A sample of Egyptian Henbane (*H. muticus*) yielded at least 83% of its alkaloids as *l.*-Hyoscyamine. 0·5% solutions of this are equal to 2% solutions of Atropine for ophthalmic purposes.—H. R. Jensen, L. ii./16,797.

Tropine may also be combined with other acids, such as salicylic or mandelic acid, to form salts. These salts when treated with diluted hydrochloric acid form a class of artificial alkaloids, to which the generic name of *tropeines* is given. One of these made from the mandelate of tropine is **Homatropine** or oxytoluyltropeine (*q.v.*)

Antidotes.—Stomach pump and emetics followed by stimulants, hot coffee, morphine hypodermically ⅓ grain every two hours or pilocarpine nitrate ½ grain, hypodermically. Electricity, heat, and artificial respiration.

Pharmacological antagonism between Atropine and Pilocarpine appears to depend on mass action rather than upon actual amounts injected into the animals.—A. R. Cushny, Jl. Ph. Exp. Therap., 1915, *6*, p. 439

Atropine Sulphate 0·02 Gm. in 1% solution (2 Cc.) given in error *intravenously* instead of Tartar Emetic to a bilharzia patient. No antidote was given yet the patient was not seriously affected.—W. B. Haddad, L. i./22,155.

Uses.—Atropine and its salts are used for ophthalmic purposes to dilate the pupil and paralyse accommodation.

Given internally or hypodermically, they are antagonistic to opium and morphine, Calabar bean and physostigmine, jaborandi and pilocarpine, aconite and aconitine, and hydrocyanic acid. Physiologically, whilst Atropine acts as a "stimulant" to a large part of the central nervous system, it paralyses many of the nerves. It lessens the perspiration, especially the night sweats of phthisis, and has been thought to stop the flow of milk and saliva, most of the secretions, but not the amount of the urine.

It is also injected to relieve pain in sciatica and is given to check bed wetting, and to relieve spasm of pain of urinary calculus, cystitis, and prostatitis. Relieves bronchial spasm, whooping cough and asthma.

Hypodermically prior to chloroform it is of value as an antidote to the cardio-inhibitory effects of the anæsthetic.

To diminish gastric secretion give Atropine in small dose in a large volume of water, on an empty stomach. Experimental proof.—T. Izod Bennett, B.M.J. i./23,366.

Typhoid Diagnostic, vide Vol. II.

GAS POISONING.—Animal experiments (rabbits) showed that doses by injection of 2·5 mgr. to 4 mgr. were most satisfactory.

Its administration tends to cure inebriety.—Owen Lankester, B.M.J. ii./05,106.

Atropine and Strychnine injection treatment for inebriety :—

First week,	Atropine	$\frac{1}{100}$	grain,	with	Strychnine	$\frac{1}{60}$	grain	*t.i.d.*
Second ,,	,,	$\frac{1}{60}$	,,	,,	,,	$\frac{1}{30}$	,,	,,
Third ,,	,,	$\frac{1}{50}$	,,	,,	,,	$\frac{1}{30}$	,,	,,
Fourth ,,	,,	$\frac{1}{100}$	,,	*sine* Strychnina.				

together with a mixture of Cinchona Extract, Sal Volatile, and Spirit of Chloroform thrice daily. A little Capsicum may also be added.

Ⓟ Mistura Antidipsomania Form No. 2:

Dose.—½ ounce (**15 Cc.**)

Concentrated Liquors of Commerce of Cinchona and Gentian 10 minims, of Capsicum ½ minim, Solution of Strychnine Nitrate (4 grains to the ounce) 1 minim, of Atropine Sulphate (1 grain to the ounce) 1 minim, Glycerin 1 drachm, Water to ½ ounce, has been found of great value with the Strychnine and Atropine injections, gradually diminished in strength.

In the knowledge of the writers Liquor Strychninæ and Liquor Atropinæ Sulphatis up to 8 minims respectively internally and then gradually reducing, together with a cinchonine tonic, worked wonders, but recently doubt as to the efficacy of Atropine has been expressed. It is of little use in the acute stage—when help is most wanted.

On commencing treatment give a general tonic and stomachic to reduce physical craving for Alcohol, *e.g.*, the following mixture 6 times daily: Atropine Sulphate Solution ¼ m., Strychnine Hydrochloride Solution 1 m., Compound Tincture of Cinchona ½ drachm, Glycerin ½ drachm, Compound Infusion of Gentian Root to ½ ounce. After 4 days this is replaced by the following every 2 hours: Liquid Extract of Cascara 10 m., Compound Tincture of Cinchona ½ drachm, Aloin $\frac{1}{16}$ grain, Strychnine Hydrochloride Solution 3 m., and Compound Infusion of Gentian Root to 1 drachm. The Strychnine is omitted after 1 week. Colloidal Gold (2 Cc. daily) is also given in equal doses thrice daily, after meals, continued for 3 weeks.—P. Bonsfield, L. ii./25,1150.

For further Inebriety Treatment see *Alcohol—Inebriety.*

References to use of Atropine and its Salts.

In ACUTE MANIA causes sleep in dose of ¼ to 1 grain of sulphate.—R.

IRITIS is to be treated locally by dilating the pupil and keeping it dilated. Henderson uses Atropine 1% with Cocaine 0·5% Ointment for the first three days every four hours. Then the Cocaine is eliminated, Atropine being used alone three or four times a day. Hot fomentations and leeches to temple beneficial.—B.M.J. i./09,1221.

CHOLERA successfully treated by hypodermic injection of Atropine. Originally advised by Sir L. Brunton to lessen vomiting. $\frac{1}{100}$ grain doses tried morning and evening. Results of value.—Sir L. Rogers, L. ii./15,222.

Will ABORT A COLD in dose of $\frac{1}{150}$ to $\frac{1}{60}$ grain (Sulphate), to be dissolved in a tumbler of water and the whole sipped in the course of an hour, to be repeated next day if necessary.

Hæmostatic action is obtainable from full doses of Atropine with development of toxic symptoms—dry mouth, flushed face, and dilated pupil. Successful in active and passive arterial and capillary, traumatic and hæmophilic forms of bleeding.—Waugh.

In PULMONARY HÆMORRHAGE in tuberculosis Atropine Sulphate $\frac{1}{100}$ grain hypodermically at intervals of 4 or 2 hours according to circumstances—acts no doubt by lowering pressure in pulmonary vessels.—J. W. Allen, Glas. Med. Jl., Nov. 1913.

CARDIAC DEPRESSION in DIPHTHERIA treated by Atropine Sulphate $\frac{1}{100}$ grain, Strychnine Hydrochloride $\frac{1}{100}$ grain, Adrenalin Solution (1 in 1,000) 5 minims, Water to 10 minims, hypodermically every four hours.—B.M.J. i./12,535.

In TUBERCULOSIS Atropine in doses of $\frac{1}{100}$ to $\frac{1}{60}$ gr. at bedtime makes sweating impossible.—Dixon, Pr. xc., 1.

EPIDIDYMITIS prevented by hypodermic or Suppository use (1/75 grain in each) of Atropine. Useful in treatment of gonorrhœa.—W. Harrison and C. H. Heald, from a Military Hospital Report.

HEART BLOCK.—In cases of high degree not due to organic causes, *Atropine* is often effective in reducing the block. Not successful in cases of complete organic block, nor does it appear to lessen either frequency or severity of the syncopal attack. Antisyphilitic treatment (Mercury, Potassium Iodide, Salvarsan) has been extensively tried in view of the fact that many cases of block are due to gumma of the bundle—results on the whole disappointing. —Pr., Nov. 12/655.

Small doses of Atropine slow the heart, whereas large doses cause acceleration. Small doses increase heart block, but large doses tend to remove it. Individuals vary considerably in reaction, but 1/100 gr., as a rule, slows the heart.—B.M.J.E. i./25,11.

In SEASICKNESS Atropine hypodermically 1/50 to 1/30 grain. As preventive 1/60 grain on embarking is efficacious.—Pres., May, 1920.

MIGRAINE well treated by Liquor Atropinæ Sulphatis 1 to 3 minims three times daily after meals.—H. D. O'Sullivan, B.M.J. i./23,18.

PYLORIC STENOSIS.—Begin with small dose of 3 or 4 drops of 1 in 1,000 watery solution of Atropine Sulphate half-an-hour before feed, increased till child is receiving 35—45 drops in 7 or 9 drop doses five times daily. Results best perceived when given over a period of weeks.—J. L. Meagher, B.M.J. i./26,89.

Infants may receive Atropine in Alcoholic solution, *e.g.*, 0·1 mgr. (max. initial dose). Most infants bear it well, one 8 months old being given 6 mg. of Atropine Sulphate daily without harm. It often has a tranquillising effect in excessively nervous children and may arrest habitual vomiting and pylorospasm; eczema and exudative diathesis is sometimes influenced favourably. Best given before meals.—per Jl. A.M.A. ii./25,938.

P1 **Atropinæ Salicylas** $C_{17}H_{23}NO_3.C_7H_6O_3 = 427{\cdot}24$.

P1 **Atropinæ Valerianas** $(C_{17}H_{23}NO_3.C_5H_{10}O_2)_2H_2O = 800{\cdot}56$.

Dose of either $\frac{1}{60}$ grain (**0·001 Gm.**).

White crystalline powders—the latter is used for neuralgia, neurasthenia and in asthma (minute doses).

P1 **Liquor Atropinæ Salicylatis.**—Atropine $\frac{1}{2}$ grain, Salicylic Acid $\frac{3}{4}$ grain, Water 1 ounce.

P1 **Atropinæ Sulphas** (*B.P.* '14). P.G. VI., P. Helv., P. Jap., U.S. X. $(C_{17}H_{23}NO_3)_2H_2SO_4 = 676{\cdot}494$. P.G. VI. and FR. Cx. $+H_2O$. Ph. Ned. V. $2H_2O$.

Dose.—$\frac{1}{200}$ to $\frac{1}{100}$ grain (**0·0003 to 0·0006 Gm.**) increased to $\frac{1}{16}$, or in cases of acute mania $\frac{1}{8}$ grain. FR. Cx. has maximum dose in 24 hours $\frac{1}{32}$ grain approx.; P.G. VI. $\frac{1}{64}$ grain.

Opaque white minute crystals or granules, soluble 1 in less than 1 of water.—W. H. M. Commercial samples melt mostly at 186° to 187° C. P. Jap. 180° C.

Incompatibles.—Bromides, Iodides. Quinine Hydrochloride is incompatible, but the acid Hydrochloride does not precipitate in reasonable dilutions. See also under Atropine.

On heating, aqueous solutions of the Sulphate are liable to be hydrolysed to Tropine and Tropic Acids. The Chloride, Nitrate and Phosphate are stable.—B.C.A., 1926, A184.

Uses.—See Atropine (base).

P1 **Tablets** $\frac{1}{100}$ grain (**0·0006 Gm.**).

Ptyalism is relieved by taking Atropine Sulphate $\frac{1}{300}$ grain in water every 4 hours.—Beddoes.

P1 **Granules de Sulphate d'Atropine.**—FR. Cx. contain 1 mgr.

P1 **Compound Asthma Fluid** (**Martindale**).

This preparation is only supplied on a prescription by a qualified medical practitioner.

It contains, amongst other ingredients, a small proportion of atropine, and is found of considerable value in preventing attacks of asthma. A few "blows" from a fine spray will be found sufficient to ward off an attack. A special **Spray** is made for the fluid.

It is prepared in 3 strengths, designated 'A,' 'B' and 'C' respectively. We find by experience that the 'A' strength is well tolerated by all sufferers, the 'B' being double strength of 'A' in Atropine is *often more effectual. The 'C,' double strength of B,' is used by confirmed asthmatics and affords relief.*

The use of atropine in asthma was first advocated by Trousseau. Its employment may effect permanent relief.

P1 **Lamellæ Atropinæ, Discs of Atropine** (*B.P.* '14).

Contain $\frac{1}{5000}$ grain of the sulphate in each, for dilating the pupil; others containing P1 $\frac{1}{500}$ (R.O.H.) paralyse the accommodation. Also prepared containing D P1 Atropine Sulphate $\frac{1}{1000}$ grain combined with Cocaine Hydrochloride $\frac{1}{200}$ grain, and $\frac{1}{50}$ grain of each, and D P1 Cocaine $\frac{1}{200}$ with Atropine $\frac{1}{5000}$ grain. (R.O.H. has D P1 Atropine $\frac{1}{200}$, Cocaine $\frac{1}{100}$ grain. D P1 Atropine Sulphate $\frac{1}{5000}$ grain with $\frac{1}{500}$ grain of Morphine are also made.)

P1 **Hypodermic Tablets** contain $\frac{1}{200}$, $\frac{1}{150}$, $\frac{1}{100}$, $\frac{1}{60}$, and $\frac{1}{50}$ grain in each, also D $\frac{1}{120}$ grain combined with Morphine Sulphate ½ grain, and Atropine Sulphate $\frac{1}{200}$ grain combined with Morphine Sulphate ¼ grain, *vide* also Morphine Sulphate.

P1 **Sterules, Hypodermic,** contain $\frac{1}{100}$ grain in 15 minims (1 Cc.). The strength of P1 **Injectio Atropinæ Hypodermica, B.P.C.** is $\frac{1}{100}$ grain in 8 minims. *Dose.*—2 to 8 minims.

P1 **Liquor Atropinæ Sulphatis** (*B.P.* '14).

Dose.—½ to 1 minim (**0·03 to 0·06 Cc.**), or more.

Strength 1%. Should be directed to be freshly prepared

P1 **Guttæ Atropinæ Sulphatis, R.O.H.,** ¼, ½, 1, or 2%.

St. Th. H. has 0·5 or 1%; U.C.H. 0·5 or 1%. St. M.'s H. 0·5%

A simple solution of Atropine is a preparation of Atropine, but a compound of several substances to which a small percentage of Atropine has been added, may more properly be regarded as a "preparation or admixture containing Atropine"—Glyn-Jones.

P1 **Guttæ Atropinæ cum Zinco, R.O.H.**—Atropine Sulphate 0·5 or 1, Zinc Sulphate 0·25, Sterilised Distilled Water to 100.

Chalk's Bottles with rubber cap on hollow stopper are convenient for eye drops and mostly employed. They are supplied in colourless and amber glass. Metal cases, sterilisable for same, are durable, and suitable for travelling.

Ophthalmic Bottle, Lang's, is intended for ophthalmic solutions and ointments. It has no ledges on which dust can accumulate. The cap of the bottle when removed rests upon three points so as to pick up the minimum of dust. A small rod or pipette stands inside.

Eye Rods have (i) pointed, (ii) flattened or (iii) bulbous ends (Lang's for ointments or solutions.

D P1 **Guttæ Atropinæ cum Cocaina, R.O.H.**

Atropine Sulphate 1, Cocaine Hydrochloride 2, Sterilised Distilled Water to 100. St. Th. H. has the same.

P1 **Sterules, Ophthalmic, of Atropine Sulphate** Solution 1% are made; also of D P1 **Atropine Sulphate** Solution ½% with **Cocaine Hydrochloride** 2½%.

P1 **Guttæ Atropinæ et Quininæ** (Liverpool Eye and Ear Infirmary). Atropine Sulphate 4 grains, Quinine Sulphate (bi-sulphate) 4 grains, Distilled Water 1 ounce.

P1 **Glycerinum Atropinæ.** St. Th. H. has Atropine Sulphate 25½ grains dissolved in Water 5 ounces, add Compound Tincture of

Lavender 100 minims, and made up to 1 pint with Glycerin. This is more cleanly than Glycerinum Belladonnæ and does not stain. It replaces Glycerinum Belladonnæ. U.C.H. is similar.

The resinous matter in the Compound Tincture of Lavender deposits. We found the following to keep better: Atropine Sulphate $127\frac{1}{2}$ grains, Water 25 ounces, Spirit of Lavender 2 minims, Spirit of Rosemary 2 minims, Cinnamon Oil 1 minim, Magenta Solution *q.s.*, Alcohol 90% 1 ounce, Glycerin to 100 ounces.

P1 **Linimentum Atropinæ.**

Atropine 1 (more or less, if ordered), Oleic Acid 15, Castor Oil 15, Oil of Lavender 1, Alcohol (90%) *q.s.* to 100.

In lumbago and other rheumatic affections is very serviceable used with gentle friction; it is readily absorbed.

P1 **Oleum Atropinæ.**

Atropine 1, Castor Oil *q.s.* to 100. Heat to dissolve. Forms a stable solution, *vide* Alkaloidal Oils, **under Oleum Ricini.**

P1 **Pessaries of Atropine** are prepared (weight 120 grains) with gelatin mass or at times with oil of theobroma, containing generally $\frac{1}{20}$ grain of the alkaloid in each.

P1 C. H. W. has Vaginal Suppositories of Atropine Sulphate $\frac{1}{18}$ grain, Lead Iodide 10 grains, Theobroma Oil to 2 drachms.

P1 **Pilula Atropinæ,** $\frac{1}{200}$, $\frac{1}{120}$, $\frac{1}{100}$, $\frac{1}{80}$, $\frac{1}{60}$ grain in each.
Taken at night, to check sweating. May cause dryness of the throat.

P1 **Pilula Atropinæ $\frac{1}{200}$ grain, Arsenici $\frac{1}{100}$ grain, et Quininæ $1\frac{1}{2}$ grains.**

Quinine Sulphate 150 grains, Arsenious Acid Trituration 10 grains, Atropine Sulphate Trituration 5 grains with Milk Sugar and Acacia *q.s.* to make 100 pills. For catarrhal cold, if taken in early stage, one every 3, 4, or 6 hours, "nips it in the bud."

P1 **Unguentum Atropinæ,** R.O.H.,* Atropine 0·5, 1 or 2, Soft Paraffin 100; heat till dissolved. P1 **Unguentum Atropinæ cum Acido Borico,** R.O.H., has Atropine 1, Powdered Boric Acid 15, Soft Paraffin to 100; and D P1 **Unguentum Atropinæ cum Cocaina,** R.O.H., has Atropine 1, Cocaine (alkaloid) 2, in Soft Paraffin 100. P1 **Unguentum Hydrargyri Oxidi Flavi cum Atropina,** R.O.H., has Yellow Mercuric Oxide 1, and Atropine 0·5, Soft Paraffin 100. P1 **Unguentum Iodoformi cum Atropina,** R. O. H., Iodoform 15, in place of the Mercuric Oxide in last preparation.

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*__Oculenta B.P.C.__ are made with a soft Paraffin basis. The strengths are:—Boric Acid 4%, Atropine 1%, Atropine 1% with Cocaine 2%, Cocaine 2%, Yellow Mercuric Oxide moist 10%, Yellow Mercuric Oxide moist 10% with Atropine 0·5%, Ammoniated Mercury 1%, Iodoform 10%, Iodoform 10% with Atropine 0·5%, Physostigmine 0·2%. (The various 'Acts' apply in supplying.)

[P1] **Atropinæ Methyl-Bromidum.** *Syn.* MYDRIASINE. $C_{17}H_{23}O_3N-CH_3Br=384{\cdot}137$.

Dose.—$\frac{1}{64}$ grain to $\frac{1}{32}$ grain (**0·001 to 0·002 Gm.**).

An addition product of Methyl-bromide to the alkaloidal base.

White crystals soluble in water 1 in 1 easily, and in alcohol 90% 1 in 8. Given internally for complaints similar to those for which atropine is employed. Also subcutaneously in croupous pneumonia, pleuritis sicca and appendicitis; dyspepsia with pyrosis (with sodium bicarbonate), and epilepsy (with bromide). As effect passes off rapidly it is useful in ½ to 2% solution with cocaine hydrochloride 1% for dilating the pupil in suspected iritis to ascertain whether adhesions exist.

For toothache, Atropine Methylbromide $\frac{1}{50}$ grain, with Aspirin 15 grains, has been given with good effect.

For bronchitic and pneumonic affections in children the following has been advised: Atropine Methylbromide $\frac{1}{20}$ to $\frac{1}{12}$ grain, Tartarated Antimony ½ grain, Antipyrin 6 grains, Syrup 1 ounce, Fresh Ipecacuanha Infusion (1 in 200) to 4 ounces. *Dose.*—1 drachm every 2 hours.

To control irregularity of heart action may be combined with Digitalis Infusion.

[P1] **Homatropine,** $C_{16}H_{21}NO_3=275{\cdot}176$.

Manufacture.—Heat Atropine Mandelate seven days on the water bath with dilute Hydrochloric Acid. Precipitate the clear liquid with Potassium Carbonate and shake out the oily base with Chloroform. Remove the latter and convert the base for further purification into the Picrate. Dissolve the picrate in water *q.s.* to retain it in solution in the cold. Add excess of Potassium Carbonate and shake out with Chloroform. The base is difficult to obtain crystalline.

[P1] **Homatropine Hydrobromide,** [P1] **Hydrochloride,** $C_{16}H_{21}NO_3.HCl=311{\cdot}641$, and [P1] **Salicylate** $C_{16}H_{21}NO_3.C_7H_6O_3=413{\cdot}224$ are readily obtainable in minute granular white crystals. Their solutions act as quick and decided local mydriatics, the pupil rapidly returning to its normal condition. The mydriatic action commences in ¼ to ½ hour, and disappears in from 6 to 24 hours. The salts are freely soluble in water; Homatropine (the base) is nearly insoluble in water, but soluble in oils, or 1 in 100 of soft paraffin. *Dose of each.*—$\frac{1}{80}$ to $\frac{1}{20}$ grain (**0.0008 to 0.003 Gm.**)

Action in checking night-sweating is said to be inferior to atropine and picrotoxin. Large doses may cause, like atropine, staggering gait, and delirium in children. Homatropine slows the heart beats and renders them irregular in force and rhythm.

Ⓟ **Oleum Homatropinæ.** A 2% solution in Castor Oil, dissolved by heat (*using the smallest amount possible*). Powder the Homatropine first.

[B] [P1] **Oleum Homatropinæ cum Cocaina** R.O.H., contains in addition 2% of Cocaine.

Homatropine Oil is used in preference to Atropine in estimating lesions of refraction; inconvenience of mydriasis may be partially overcome by Eserine. These oily solutions are not washed out by the tears.

P1 **Homatropinæ Hydrobromidum** (*B.P.* '14). **U.S. X., P.G. VI., P. Helv., P. Svec.** and **P. Jap.** $C_{16}H_{21}NO_3HBr=356{\cdot}10$.

Dose.—$\frac{1}{80}$ to $\frac{1}{20}$ grain (**0.0008 to 0.003 Gm.**). (U.S. *av.* $\frac{1}{120}$ grain).

In minute trimetric crystals, soluble 1 in 6 of Water.

Ⓟ **Guttæ Homatropinæ R.O.H.**, 1 or 2%.

B P1 **Guttæ Homatropinæ cum Cocaina, R.O.H.**

Homatropine Hydrobromide 1 or 2, and Cocaine Hydrochloride 2 in Water 100.

Menthol 2 grains, Methyl Salicylate 2 minims, and Tincture of Iodine 2 minims, to the pint of distilled water as an antiseptic solvent of Homatropine and other alkaloidal salts for eye work.—N. Bishop Harman, B.M.J. ii./16,178. See also *ibid.* i./20,599.

Ⓟ **'Sterules' (Ophthalmic) of Homatropine Hydrobromide Solution,** 1% are prepared, also

B P1 **'Sterules' (Ophthalmic) of Homatropine Hydrobromide Solution** 1% with **Cocaine Hydrochloride** $2\frac{1}{2}$%.

Ⓟ **Injectio Homatropinæ Hypodermica,** 1 in 120, is used.

Dose.—1 to 6 minims (**0·06 to 0·4 Cc.**).

Ⓟ **Tablets, Hypodermic,** contain $\frac{1}{200}$ grain.

(**'Sterules' of Distilled Water,** containing 5 Cc. are useful for dissolving hypodermic tablets in the syringe.)

Ⓟ **Lamellæ Homatropinæ** (*B.P.* '14) contain $\frac{1}{100}$ grain (**0.0006 Gm.**) of Homatropine Hydrobromide.

B P1 **Lamellæ Homatropinæ et Cocainæ (Gelatin Ophthalmic Discs)** contain of each $\frac{1}{50}$ grain (**R.O.H.**) for paralysing the accommodation, also made $\frac{1}{200}$ grain of each.

P1 **Methyl-Atropine Nitrate.** *Syn.* ✱**Eumydrine (T.M. 322533)** $C_{16}H_{19}NO_3.CH_3.CH_3\ HNO_3=366{\cdot}224$.

PATENT 25,804/1901 became void 1906.

Dose.—$\frac{1}{60}$ to $\frac{1}{24}$ grain (**0·001** to **0·0025 Gm.**).

Manufacture.—Although the patent specification mentions the use of Methyl Nitrate, to be employed by direct addition in presence of Methyl Alcohol at a temperature of 110° C. in a closed vessel for 2 hours, we believe that the more rational procedure would be to heat the alkaloidal base with Methyl Iodide in Methyl Alcohol Solution to 100° C., forming Atropine-Methyl-Iodide, and then to convert this into Hydroxy-Methyl-Atropine by means of freshly precipitated Silver Oxide. Finally prepare the nitrate in the usual manner.

A white odourless powder, M.pt. 163° C., soluble in water, a powerful mydriatic, and less poisonous than Atropine. 1% or 2% solution dilates the pupil after 25 minutes, the maximum is reached in 50 minutes. Dilatation persists for 12 hours.

AURINARIA.

Ear cones or aural bougies are made with Cacao butter basis, and are medicated :—

Aurinarium—

Acidi Borici 1 grain.
Acidi Carbolici $\frac{1}{10}$ grain.
𝔇 𝔓1 Cocainæ Hydrochloridi $\frac{1}{10}$, $\frac{1}{5}$ grain.
Unguenti Hydrargyri Nitratis $\frac{1}{3}$ grain.
Iodoformi $\frac{1}{2}$ grain.
𝔇 𝔓1 Morphinæ Hydrochloridi $\frac{1}{10}$, $\frac{1}{5}$ grain, atque cum Cocaina $\frac{1}{10}$ grain.
𝔇 𝔓1 Morphinæ $\frac{1}{10}$, Cocainæ $\frac{1}{10}$, Acidi Borici 1 grain.
𝔇 𝔓1 Morphinæ $\frac{1}{10}$ grain, Ext. Bellad. $\frac{1}{5}$ grain.
𝔇 𝔓1 Opii, $\frac{1}{5}$, 𝔇 𝔓1 $\frac{1}{2}$ grain.
Plumbi Acetatis $\frac{1}{2}$ grain, atque cum Acid. Borico 1 grain.
𝔇 𝔓1 Plumbi Acet. et Opii $\frac{1}{5}$ grain. Zinci Sulphatis $\frac{1}{2}$ grain.
Zinci Sulphocarbolatis $\frac{1}{2}$ grain.

They should be retained with a pledget of cotton wool.

AURUM.

$Au = 197{\cdot}2$.

For dental fillings the metal is employed in 'cohesive' and 'non-cohesive' form.

Colloidal Gold, see Colloidal Metals.

Auri Bromidum. $AuBr_3 = 436{\cdot}948$.

Dose.—$\frac{1}{64}$ to $\frac{1}{10}$ grain (**0·001 to 0·006 Gm.**), increased to $\frac{1}{5}$ grain, well diluted.

A brown powder, soluble in water 1 in 75.

Uses.—In epilepsy, hysteria and migraine, is well tolerated. In nervous dyspepsia, amenorrhœa, and chronic Bright's disease. Epileptics who have taken it sometimes remain for years free from attacks. Useful in alcoholic neurasthenia ; the 'Gold Cure' combined with **Hyoscyamine (or Atropine)** and Strychnine treatment has proved of value.

𝔓1 **Liquor Auri et Arsenii Bromidi.**

Auric Bromide $1\frac{1}{2}$ grains, Oxybromide of Arsenium 3 grains [or Clemens' Solution (*q.v.*) 192 minims], Distilled Water to 1 ounce. *Dose.*—5 to 10 minims (**0.3 to 0.6 Cc.**).

Liquor Auri et Hydrargyri Bromidi.

Auric Bromide, Mercuric Bromide, of each $1\frac{1}{2}$ grains, Distilled Water to 1 ounce. *Dose.*—5 to 10 minims (**0.3 to 0.6 Cc.**) has been used in neurasthenia, epilepsy, syphilis, and acne.

GOLD CHLORIDE, VARIETIES OF, IN COMMERCE.

Auri Tri-Chloridum (Purum), $AuCl_3 = 303{\cdot}571$. Contains about 65% Au. and is official in FR. CX. and the Portuguese Pharmacopœia. This salt is in very little use in this country A brown variety is also made. It contains xH_2O.

Auri Tri-Chloridum Acidum. *Syn.* **Aurochloric Acid.**
$AuCl_3.HCl.4H_2O$=412·1.

Dose.—$\frac{1}{64}$ to $\frac{1}{16}$ grain (**0·001 to 0·004 Gm.**), increased to $\frac{1}{4}$ grain. In yellow crystals; contains about 50% of gold. Is deliquescent and easily soluble in water. Has been given as an alterative in phthisis.

Sterules of this Salt and of Gold and Sodium Chloride in various amounts have been made.

Auri et Sodii Chloridum. Gold and Sodium Chloride
$AuCl_3.NaCl,2H_2O$=398·057 (Fr. Cx.).

Dose.—$\frac{1}{30}$ to $\frac{1}{12}$ grain (**0·002 to 0·005 Gm.**), increased to $\frac{1}{2}$ grain in a pill with kaolin ointment. *Hypodermically*, $\frac{1}{12}$ grain (**0·005 Gm.**) doses have been given.

This is the ordinary **Commercial "Chloride of Gold,"** *e.g.*, the "Scales" Brand, as largely used in photography. An orange-yellow crystalline, deliquescent powder, soluble 1 in 2 of water, only partially soluble in alcohol. The Fr. Cx. preparation contains a *molecule of each salt* combined, yielding approximately 50% of metallic gold. It is sometimes used as a caustic, and given internally for syphilis. Combined with strychnine it is useful in neurosis.

In locomotor ataxia, the Chlorides of Gold and Sodium $\frac{1}{10}$ grain in pill form seem to have some power of retarding the degenerative process; arsenic $\frac{1}{20}$ grain in solution thrice daily is also believed to act in the same way. Alternate monthly courses of each advocated.—Whitla, Pract. Med.

Cirrhosis of the kidney has been well treated by Chloride of Gold and Sodium; said to improve character of the urine, to diminish the frequency of nocturnal micturition and to increase general well-being.—Tirard, Med. Treatment.

Commercial "Chloride of Gold and Sodium" consists of **Auri et Sodii Chloridum** (50% Au) mixed with an equal weight of sodium chloride. It contains, therefore, 25% Au approximately.

$\boxed{\text{P1}}$ **Auri et Potassii Cyanidum.** — $KAu(CN)_2+2H_2O$=324·344.
Dose.—$\frac{1}{64}$ to $\frac{1}{3}$ grain (**0·001 to 0·02 Gm.**).—*with caution*

White crystalline soluble powder.

In lupus and in syphilis has been used. Intravenously the dose was found to be 0·02 to 0·05 Gm. for adults, and 0·0005 to 0·03 Gm. for children. To the dose in 1% solution 50 Cc. of Normal Saline Solution are added, and given every second or third day to the extent of 12 injections. The injection is said to be quite painless. After 48 hours a local reaction occurs. *Caution*:—The doses seem large. We have no personal knowledge of them.

***Sanocrysin** (T.M. 448683).
Probable composition:—$(AuS_2O_3.Na.)\ Na_2S_2O_3$.

It may be regarded as a double Thiosulphate of Gold and Sodium, $Au(S_2O_3)_2Na_3$.

Pharmacology and Dosage.

Doses of 0·01 to 0·04 Gm. per kilo have little effect on the sound organism (experiments intravenously on calves, monkeys and rabbits). The weak point is the action on the kidneys, but 0·02 Gm. per kilo as a max. therapeutic dose is not harmful. Note, however, that considerably less dose has been used in man.

A relatively recent consummation is that $\frac{1}{2}$ to 1 Gm. doses at intervals of 1 to 2 weeks are less likely to be dangerous than 1 Gm. doses every 3 or 4 days.

This treatment of tuberculosis was introduced by Prof. H. Moellgaard.—B.M.J., i./25,643.

As with Krysolgan, a few years previously, there has been the same downward graduation of dosage in response to poisoning cases. Instead of 1 and

1·5 Gm., initial doses of 0·125 and even 0·05 Gm. have been given intravenously. No doubt that many of effects are due to Gold poisoning.—L.i./25,934.

PRELIMINARY REPORT BY THE MEDICAL RESEARCH COUNCIL. Embodies about 30 cases. Early cases of open tuberculous infection of the lungs showed some evident improvement, though there was no dramatic benefit. More advanced cases did not stand the treatment well—some were made worse—the drug seems to exert a specific action on tuberculous tissue.—B.M.J., i./25,735.

SECOND REPORT BY THE MEDICAL RESEARCH COUNCIL. Experience in selection and treatment of cases has lessened dangers attending its use. One death recorded in 140 cases (2 deaths in 30 in the first Report). Risk remains. Patients must be in bed under close medical control. There is definite hope of a drug along these lines. Need for extreme care.—B.M.J., ii./26,158; L., ii./26,181.

The 30 cases in the M.R.C. Report might have shown better results with Tuberculin. To discover the pyschic effect of a new remedy, a Normal Saline and Phenol solution was labelled "New Tuberculin, O.K.", deceiving staff and patient. After a series of injections with 8 patients, 4 claimed (and showed) definite improvement, 2 were uncertain and 2 definitely negative!—W. C. Fowler, L. i./25,893.

The treatment is not agreeable but it shortens the duration of lesser degrees of tuberculosis, and where sufficient tissue with vital energy remains, gives good results in more chronic cases. It is extremely dangerous in the more severe forms—it provides a last chance, which, failing, might accelerate death. Early cases of glandular and pulmonary tuberculosis in children well treated, but later stages less amenable. Local application in surgical tuberculosis beneficial. Special laboratories instituted in Denmark to make the compound.—Leader, B.M.J., i./25,176.

Further discussion on and experiments with Sanocrysin, by Prof. O. Bang. He states that 1 in 3,200 solution does not interfere with the growth of tubercle bacilli.—B.M.J., i./25,1096.

Effective in tuberculosis of the lungs of less than one year's standing, but in older cases treatment is uncertain.—Knud Faber of Copenhagen, L. ii./25,62.

Favourable report on 8 cases.—Prof. S. L. Cummins, L. ii./25,299.

Treatment of pulmonary tuberculosis: Small doses as good as large ones. Use of serum abandoned. Discussion Roy. Soc. Med.—B.M.J., i./26,100.

The salt penetrates the lipoid substance of the bacillus and carries the gold into its body, killing and dissolving it with immunizing effect.—Mary F. Nannetti, B.M.J., i./26,945.

According to Sir Almroth Wright there is no evidence that the compound as a chemo-therapeutic agent is able to destroy the bacillus.—B.M.J., i./26,102.

Eleven cases. More rapid improvement in pulmonary tuberculosis than could be obtained by any other method.—Prof. T. R. Elliott, L. i./26,126; see also *ibid.* 134.

Best results in recent and active tuberculous inflammations. Unlikely to prove useful in lupus and renal tuberculosis.—Prof. T. R. Elliott, per B.M.J., i./26,486.

Experience with Sanocrysin.—per Jl.A.M.A., ii./25,1102.

Toxic Reactions and Deaths.

The three principal reactions—fever, rash, and albuminuria—act as guides to conduct of case. In obviously difficult cases preliminary serum treatment is necessary to avoid albuminuria. *Nine patients died as direct result of treatment.* All slight cases which became symptom-free under treatment reacted violently. It is only suitable for hospital practice.—B.M.J., i./25,273.

The toxic effects are the same in tuberculous and non-tuberculous subjects. They are due to metal poisoning and not cleavage products from the bacilli. No demonstrable specific action in tuberculosis.—E. Le Blanc, M.m.W., Mar. 12,26,444; per Pres., Aug. '26,297.

Re metallic intoxication.—American criticism, see L. i./25,501; see also *ibid.* 239,556.

May shorten length of treatment, increase immunity of patient, and may even make difference between life and death, but should not be undertaken unless physician has read or seen something of its use and understands possible dangers that may arise.—C. A. Sprawson, I.M.G., Dec. '26,588.

If the compound is to be of any service it will not be along the lines of Moellgaard's hypothesis, but as an ordinary Gold salt. It acts as other Gold salts, the results of which have been variable and inconclusive. Caution needed. —Pres., Aug. '26,297.

The indications for serum in the course of Sanocrysin treatment. Serum given intramuscularly, 20 Cc. per day.—K. Secher, Ugeskr.f. Laeger, Aug. 20, '25,725; per Pres., Aug. '26,294.

Retards growth of tubercle bacillus in cultures in 1 part in a million. (Moellgaard said 1 in 100,000). Animal experiments suggestive but certainly not conclusive. Still on trial.—W. E. Dixon, B.M.J., i./25,815. *These statements are not supported by other workers.—v. antea.*

Drugs in tuberculosis reviewed.—Cerium, Copper compounds, etc. Krysolgan, a Gold compound, and Sanocrysin.—W. E. Dixon, B.M.J., i./25,813.

Review of current literature.—Pres., Aug. '26,293-298.

Dangers greatly exaggerated. With careful usage should only very rarely cause harm. Has an apparent specific effect on the tuberculous process, but is still far from a 'cure.' Best results in early and pneumonic type.—A. Morland and E. Zimmerli, L. i./27,652.

P1 ✱ **Krysolgan** (T.M. 439288) prevents the growth of the tubercle bacillus in 1 part in a million. Animal results not promising, but clinical results hopeful and inspiring.—W. E. Dixon, B.M.J., i./25,815. Severe reactions from.—B.M.J.E., i./22, 77.

Pulmonary tuberculosis.—Review of methods of treatment including gold and other heavy metals and colloidal calcium. Reactions very similar to those with tuberculin.—C. Riviere, B.M.J., i./26,771.

Lupus erythematosus treated by Krysolgan.—H. C. G. Semon, B.M.J., ii./27,258.

A. Cowan Guthrie claims to be the originator of the Colloidal Gold treatment of tuberculosis, having introduced '**Auro-cyanase**,' a double colloidal cyanide of Gold and Potassium, which was found effective in all stages of the disease. The preparation is given subcutaneously over the deltoid, the administration of leucocytic extract before, during and after the injections preventing the general reaction which otherwise occurs.—B.M.J., i./25,284.

BARIUM.

Ba=137·37.

Ⓟ *All Salts of Barium except the Sulphate.*

Ⓟ **Barii Sulphidum.**—BaS=169·434.

Dose.—½ to 1 grain in pills coated so as to be more likely to dissolve in the intestines than in the stomach.

A greyish yellow powder, soluble in water, given as an alterative in syphilitic affections.

Ⓟ **Barium Sulphide Depilatory.** *Syn.* (CAUSTICUM BARII).

Barium Sulphide, in fine powder from 1 to 3, Wheat Starch 3.

When required for use, make into a cream with water, spread on the part and let it remain five or ten minutes, then remove with a blunt knife.—N.B.—It temporarily reddens the skin.

Ⓟ *Another formula* is Barium Sulphide 5, Powdered Soap 1, French Chalk 7, Starch 7. One part of this mixed with 3 of water, applied to the skin, and to avoid possible dermatitis, is washed off after 5 minutes. Applied in hypertrichosis from time to time will keep the growth under.

Strontium Sulphide.—$SrS = 119{\cdot}694$, is also used. A patented German preparation contains Strontium Sulphide 12, Corn Starch 40, Talc 35, Dextrin 7, Nerolin 1, and Essential Oil 5 parts. It is claimed that the Dextrin protects the skin and hair papilli and prevents the bad odour during use.—P.J., i./25,13.

Barii Sulphas. P.G. VI., U.S. X.—$BaSO_4 = 233{\cdot}434$.

Dose.—For X-ray work only, 2 to 5 ounces (**60 to 150 Gm.** approx.) in a cornflour or other 'meal' of about 6 to 15 ounces.

A heavy white powder insoluble in water and acids.

In X-ray diagnosis for outlining portions of the alimentary tract, instead of Bismuth Carbonate and Subnitrate (*q.v.*).

Has the advantage of being totally insoluble. Cases of Bismuth poisoning have resulted from the use of Bismuth Salts. The latter, however, have the advantage of higher molecular weight, and hence form darker shadows.

Barium Sulphate Suspensions in Olive Oil 10, 20%, etc., in bladder examination.—L. i./14,236

For an opaque enema—Barium Sulphate 12 ounces mixed with Kaolin and warm water.—A. C. Jordan, B.M.J. ii./13,1348.

Atropine is a valuable adjuvant in visualisation of the appendix. A dose of 1 mg. Atropine in an enema an hour before the Barium Sulphate contrast suspension increased visualisation from 18% of 22 patients (given the Barium Sulphate alone) to 50% of 36 patients.—per Jl.A.M.A., ii./25,1762.

Enema Barii Sulphatis C.X. *For X-ray Examinations.*

Barium Sulphate 192, Methylated Spirit 45, Mucilage of Gum Acacia 20, Distilled Water to 900 (6 ounces, 1½ ounces, ¾ ounce, to 30 ounces respectively).

U.C.H. directs Barium Sulphate 40 ounces, Tragacanth Powder 60 grains Water to 80 ounces. Dilute with equal amount of water at time of use.

Emulsio Barii et Bismuthi C.X. *For X-ray Examinations.*

Barium Sulphate 16, Bismuth Carbonate 16, Water 45.

(½ ounce, ½ ounce and 1½ ounces respectively.)

Bariumised Wool for X-ray work in œsophagoscopy.—W. Frank Wilson, B.M.J., i./25,656.

SULFATE DE BARIUM GELATINEUX FR. CX. Nouv. Supp. '26, is in paste form, containing 55 to 58% of water.

Ⓟ**Barium Thiosulphate** inadvertently administered in place of Barium Sulphate caused death.—P.J. ii./21,315; C. & D., Oct., 1921, p. 47.

Caution.—*Barium Carbonate* is also soluble and hence poisonous. Confusion with Bismuth Carbonate occurred.—P.J. ii./21,344.

Ⓟ**Barium Chloride** and other Salts are in the Supplementary List of Drugs.—*q.v.*

BELLADONNA.

Deadly Nightshade.

P1 "*Belladonna and all preparations or admixtures (except Belladonna Plasters—which are* Ⓟ) *containing* 0·1 *or more per cent. of Belladonna Alkaloids.*"

All parts of the plant *Atropa Belladonna* (*Solanaceæ*) yield the alkaloids Hyoscyamine and Atropine. The root contains from 0·3 to 0·8% (Maben states rarely as much as 0·5%) of total alkaloids—chiefly Hyoscyamine. Old roots may contain a little Atropine.—Henry. The leaves contain 0·2 to 0·7%, principally Hyoscyamine.

The **total alkaloids** of Belladonna are twice as active as Atropine, without being more toxic. Recommended in treatment, especially in spasm and vagotomy.—L. ii./25,241.

For details as to varying Alkaloidal content of the Drug and Assay Methods see Vol. II.

INTERNATIONAL PREPARATIONS of Belladonna compared, with special references to their standardisation.—A. J. Jones, P.J. ii./23,106.

Antidotes.—See Atropine. Poisoning by belladonna is well treated by pilocarpine.

Poisoning by children eating Belladonna berries. Pilocarpine 1/10 grain hypodermically, hot water bottles, subsequently more pilocarpine (1/6 grain) and again repeated with soap enema. Recovery.—Mary E. Joll. L. ii./16, 647.

Eating rabbit which had fed on the plant caused poisoning. Pupils became dilated, mouth dry; giddiness and rapid pulse.—D. Firth and J. R. Bentley, L. ii./21,901.

Poisoning by topical application of a liniment containing Belladonna.—Fried, per Clin. Jl. May 30/23,264.

A fatal case of (most probably) chronic Belladonna poisoning, in which 1 to 2 drachms of the Tincture had been taken every day for 6 years.—J. Spears, B.M.J., i./27,1105.

P1 **Belladonnæ Folia** (*B.P.* '14), U.S., and P. Helv. contain not less than 0·3% total or mydriatic alkaloids. *Dose.*—1 grain.

Those of FR. CX. have no standard. Maximum single dose 2 grains, maximum during 24 hours 7½ grains approximately.

P1 **Belladonnæ Radix** (*B.P.* '14) without standard. U.S. requires 0·45% total alkaloids of Belladonna.

Dose.—¾ grain (**0·05 Gm.**).

Uses.—Externally relieves the pain of rheumatism, neuralgia, chordee, and local inflammations, as of the breast. In leucorrhœa, vaginal injection of Tincture 3, Sodium Bicarbonate 1, and Water 100 is useful.—R.

Internally relieves spasm, palpitation, menstrual pain, headache, whooping-cough, **petit mal**, checks profuse perspiration, and incontinence of urine. In acute sore throat. Acts on the eye as a mydriatic. Relieves the dyspnœa of asthma. A rash on the skin, said to be like that of scarlet fever, may be produced by internal and local use of Belladonna.

May produce congestion of the throat.—B.M.J. ii./09,542.

HEART FAILURE in diphtheria treated with.—L. i./06,282.

OBESITY associated with voracious appetite well treated. By its inhibitory action on the secretion of the gastric glands Belladonna reduces hyperacidity of the gastric juice and thus takes the edge off the appetite. Especially indicated where there is cardiac weakness which prohibits physical exercises.—B.M.J.E. ii./13,39, *cf.* also Atropine.

URINARY INCONTINENCE.—Belladonna should only be used to 'break the habit' and never pushed for more than two months at a time. It is useless and even harmful when there is definite lack of tone in the sphincters; here Nux Vomica is indicated. Thyroid (advocated by Leonard Williams) is useful in some cases, especially when there are adenoids. Alkalis may be useful where the urine can be shown to be hyperacid.—F. Hernaman-Johnson, L. i./21,1295.

ASTHMA is due to over-excitability of the pneumogastric system; Belladonna is the best remedy.—per Pres., Jan. '23,10.

Though used 'to allay the sense of griping' in the intestines, when given with purgatives, there is no evidence that it does so.

P1 Collodium Belladonnæ.—*Martindale.*

Shake liquid Extract of Belladonna (*B.P.* '14) 50, Magnesium Oxide Light 1, with Canada Turpentine 4, Castor Oil 2 and Ether 40, allow to stand 12 hours. Decant, filter, dissolve Camphor 1½, and Proxylin 2½ in the mixture and add Ether *q.s.* to 100.

℗ Emplastrum Belladonnæ. (*B.P.* '14). (℗ *cf.* Emp. Plumbi).

The B.P. '98 plaster produced toxic symptoms (skin irritation). It was only half the strength of that of the B.P 1885, but it was still too strong to be used with safety. The *B.P.* '14 plaster was again reduced to ½ strength, viz., it contains 0·25% alkaloids.

An explanation of its supposed effect in stopping milk secretion is that after the plaster is applied no milk is removed, and so less and less is secreted—the action is merely mechanical.—D. Grieve, C. & D., Dec., 1921, p. 856.

See also K. Mackenzie under Pituitary Extract.

Bee and wasp stings are well treated by belladonna plaster—if slight, left on short time; if severe (? entered vein), several days may be necessary—gives considerable relief. Probably good for mosquito stings also.

℗ Emplastrum Belladonnæ Extensum.

Belladonna plaster in rubber combination spread on calico in porous sheets 7 in. by 5 in. and in yard rolls 7 in. wide, porous and non-porous, also prepared with belladonna and aconite combined.—(*American*).

℗ Emplastrum Belladonnæ, U.S. X. An adhesive plaster containing Extract of Belladonna leaves corresponding to not less than 0·25% or more than 0·3% of the alkaloids of the leaves.

℗ Fr. Cx. has Belladonna Extract (Fr. Cx. *q.v.*) 1, Elemi 1, Diachylon Plaster (Fr. Cx.) 2.

P1 Extractum Belladonnæ Liquidum (*B.P.* '14).

Dose.—⅓ to 1 minim (0·02 to 0·06 Cc.).

Prepared from Belladonna root in fine powder, by repercolation process, adjusting so that the extract contains 0·75% alkaloids.

The *B.P.* '14 method is most wasteful of Alcohol, and laborious. Franklin says take 200 oz. of root in 20 powder, moisten with menstruum as in B.P., macerate and percolate slowly. Reserve the first 85 ozs. and continue to another 85. Recover the Alcohol, evaporate to soft extract and dissolve in the reserve and assay. Add menstruum sufficient quantity to make 0·75% strength.—J. H. Franklin, P.J., i./27,52.

Almost the whole of the alkaloid is contained in the first 4½ gallons, using 100 lbs. of root and a total of 10 gallons of menstruum. The actual figures were, for the first 4½ galls. 1·07%; second 4½ galls. 0·0434%; third 1½ galls. 0·01%. The B.P. formula should be altered to collect the first 85 parts from 100 parts, instead of the 33 1/3 parts.—J. H. Franklin, P.J., ii./27,395.

P1 Extractum Belladonnæ Siccum (*Syn.* **Alcoholicum**) (*B.P.* '14).

Dose.—¼ to 1 grain (0·016 to 0·06 Gm.).

This is prepared *from the leaf*—it is a mixture of alcoholic extract and powdered leaf, containing 1% of alkaloids. F.I. (Second) recommended 1·3% alkaloids.

The 1·3% alkaloids is roughly a mean figure of the standards in the chief pharmacopœias.—P.J., i./26,294.

Enuresis in children is best treated by increasing doses of Belladonna extract at bed time, tonic measures, such as cod liver oil, iron and nux vomica should be employed during the day time.—Tirard, Med. Treatment.

P1 Extractum Belladonnæ F.I. to be a "solid" extract (containing about 10% of water) prepared by means of alcohol 70% from the leaf.—Fr. Cx., and P. Dan. agree with F.I. The Fr. Cx. follows the F.I. method of making and gives a method of estimating, but does not set up a standard. It states max. single *dose* ½ grain. Max. in 24 hours 1½ grains approx.

P1 **Extractum Belladonnæ (Foliorum) U.S. X.**, made with 3 parts alcohol and 1 water as solvent and contains added glucose for pilular consistence. Powdered Extract is made differently. Both contain a mean of 1·25% Belladonna alkaloids.

P1 **Extractum Belladonnæ, P. Austr.**, is alcoholic from the leaves and contains 2% alkaloids; P1 **Ph. Ned. V.** is the same but contains not less than 1·15 to 1·3% alkaloids. P1 **P. Belg.** contains 1·5% alkaloids. For average yield of alkaloid, see Vol. II.

P1 **Extractum Belladonnæ Viride** (B.P. '98).

Dose.—¼ to 1 grain (**0·016 to 0·06 Gm.**), increased to 2 grains or more.

A green extract prepared from the expressed juice of leaves and young branches (3 to 3½ ounces are procurable from a pound of leaves; it contains from 0·5 to 2·0% (average 1) of alkaloids, and standardised to contain 1%.

P1 **Fluidextractum Belladonnæ Radicis, U.S. X.**

Average dose.—¾ minim (**0·05 Cc.**). Hydroalcoholic percolate; contains 0·45 Gm. Belladonna alkaloids in 100 Cc. *For assay vide Vol. II.*

P1 **Glycerinum Belladonnæ, B.P.C., R.O.H.**

Green Extract of Belladonna, 1 ounce; Boiling Distilled Water, 1 drachm. Rub in a warm mortar to a smooth paste, and add Glycerin, *q.s.*, to 2 ounces (fluid).

To check pain and inflammation, is often painted on boils, abscesses and carbuncles, and covered with a poultice, also applied on lint to the breasts to disperse milk.

Tragacanth added in proportion of 6 grains to the ounce would thicken the preparation.

P1 **Linimentum Belladonnæ** (*B.P.* '14).

Camphor 1, Alcohol (90%) 6. Dissolve and add Liquid Extract of Belladonna 10, Distilled Water 2, Alcohol (90%) *q.s.* to 20. A useful sedative for neuralgia and rheumatism. Contains 0·375% alkaloids.

Sprinkled on impermeable piline relieves lumbago.

Poisoning by the Liniment. Strychnine hypodermically, strong tea, and making the patient vomit, brought a patient round.

P1 **Linimentum Belladonnæ cum Chloroformo.** Chloroform Liniment 1, Soap Liniment 1, Belladonna Liniment 2.

P1 B.P.C. Chloroform 1, Belladonna Liniment 7. (The previous form may be better for sensitive skins.)

Ⓟ **Linimentum Belladonnæ Dilutum, L.I.P.**—Belladonna Liniment (Methylated) 1, Simple Liniment (L.I.P.) 3 parts. (**Linimentum Simplex, L.I.P.**, is Soft Soap 1, Methylated Spirit 2.)

Ⓟ **Pilula Quininæ cum Belladonna, R.O.H.**

Green Extract of Belladonna ⅕ grain, Quinine Sulphate 1 grain, Confection of Roses *q.s.*

P1 **Pilula Belladonnæ, Nucis Vomicæ et Cannabis.**

Extract of Belladonna, Nux Vomica Extract and Cannabis Extract, of each ½ grain. For the constipation in gastric ulcer. The cannabis has a good effect on the mental side, belladonna regulates peristalsis and the nux vomica has a good effect as an aperient and for improving tone of the gut.

P1 **Suppositoria Belladonnæ** (*B.P.* '14).

Each contains 0·14 Cc. of freshly evaporated Liquid Extract o Belladonna in 1 Gm. of Theobroma Oil, *i.e.*, 0·001 Gm. of roo alkaloids.

℗ **Pessaries** (60 grains weight) may also be made containing th same or double the quantity of extract. *Vide also* **Ovules.**

Unilateral convulsions have been produced by their use, togethe with dryness of throat, dilated pupils (special idiosyncrasy).

P1 **Suppositoria Belladonnæ** ½ grain, **et Morphinæ Hydrochlorid** ¼ grain.

These possess a useful sedative effect, and are valuable in irritated and painful conditions of the rectum and prostate and for chordee

℗ **Tinctura Belladonnæ** (*B.P.* '14).

Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

This is prepared 10% *with dried leaf* and standardised to 0·035% alkaloids=F.I. approx., Fr. Cx., Ph. Ned. V. and U.S. are similar *B.P.* '98 was Liquid Extract of Belladonna (root) 1, Alcohol (6 per cent.) *q.s.* to 15. Hence the *B.P.* '14 tincture differs in colour *It is* $\frac{7}{10}$ *strength of B.P.* '98.

Uses.—Relieves the spasm of asthma and bronchitic cough; als bladder spasm set up by calculi and prostatic irritation. Full doses ar useful for incontinence of urine. Of value in dyspepsia (*vide* ref. *post.*

Flavoring.—Syl Myristicæ, Syl Rosæ ; Syrupus Aurantii.

℗ **Tablets** are prepared equivalent to 2 and 5 minims weighing 1 and 2 grains respectively.

BRONCHO-PNEUMONIA sometimes well treated in early stages with 4 to minim doses or ¼ grain of extract every 3 or 4 hours according to age of chil and severity of case—combine with diuretics and diaphoretics.—M.P.C Jan. 16, '09,601.

In DYSPEPSIA administration of 5 minim doses of Tincture before foo results in reduction of acid values both absolute and relative of the stomac contents. Exerts an influence in inhibiting and relieving spasmodic contra tions.—B.M.J., ii./10,1775.

The volume of the gastric contents does not diminish, though the percentag of Hydrochloric Acid in the gastric contents is always diminished. Th differs strikingly from the effect of Atropine on other glands.—P.R.S.M Med. Sect., Dec./10,23.

For PTYALISM (in a patient affected with paralysis agitans) 10 drops Tincture thrice daily or Pilocarpine Nitrate $\frac{1}{30}$ grain.—B.M.J. i./13,1143.

APPENDICITIS has been treated by full doses (10 to 15 minims) with sodiu salicylate.

EXOPHTHALMIC GOITRE has been treated with belladonna, and with arseni bromide, and digitalis added.

In ENURESIS valuable, give first potassium citrate, when the urine is hype acid, or Sodium Acid Phosphate if markedly alkaline.

POST-ENCEPHALITIC PARKINSONISM well treated with Tincture of Bell donna, 45 minims daily.—A. J. Hall, B.M.J., i./26,129.

℗ **Mistura Belladonnæ Xanthoxyli et Hyoscyami.** *Syn.* TOWN SPECIFIC. *Dose.*—6 to 8 minims (**0·4 to 0·5 Cc.**).

Belladonna Leaf Tincture (U.S. 1890) 2, Fluidextract of Xanth xylum 1, Fluidextract of Hyoscyamus 1.

The above dose is equivalent to a little less than 3 to 4 minims B.P. Tincture. Said to be specific in morphinism, cocainism, and alcoholism.

Increase from 6 drops, by 2 drops every 6 hours, until 16 drops have be reached. Discontinue for a few doses if symptoms of Belladonna poisoni are observed.—E. Huntington Williams, "Opiate Addiction."

P1 Linimentum Belladonnæ Æthereum.
Prepared with Ether, 1 in 1½, with Camphor $\frac{1}{20}$. Recommended in place of Alcoholic Liniments for quicker absorption.—L. ii./90,67; *N.B.*—Name altered. Previously called *Ethereal Tincture.*

P1 Unguentum Belladonnæ (*B.P.* '14).
Contains a basis of Benzoated Lard and Wool Fat. Made by evaporating Liquid Extract of Belladonna *q.s.* to provide 0·6% alkaloids.

Said to be too strong for general use and may cause unpleasant symptoms.

To lessen excessive secretion in nasal catarrh, this ointment has been employed diluted 5 to 10 times with Soft Petroleum and a small proportion of Tannin or Gallic Acid added.

Ⓟ **Unguentum Populeum**, P. Belg. Macerate Dry Belladonna Leaves 125, Dry Henbane Leaves 125 and Dry Poplar Buds 200 (all bruised) in Alcohol 90% 150 for 2 hours; transfer to a water-bath with Lard 1000, heat 3 hours with constant stirring until the Alcohol has evaporated. Strain, press and stir until the ointment sets. The formula in Fr. Cx. differs from this.

BISMUTHUM.

$Bi = 209{\cdot}0$.

The absorbent action of the preparations of bismuth taken internally is increased by combination with antiseptic compounds. These combinations have been much recommended in those disorders of the digestive tract in which several infectious diseases make their early manifestation. Thus the salicylate, and naphthol, phenol, pyrogallol and bromophenol compounds have been brought into use. These check the fermentative processes forming ptomaines, yet, it is said, do not interfere with intestinal digestion. In syphilis, Bismuth, especially in organic combination (*q.v.*) has been much used by injection instead of mercury. Bismuth compounds are in general ***incompatible*** with potassium iodide, the insoluble brown bismuth tri-iodide being formed.

Bismuth Poisoning.—The most striking features are stomatitis, a black line and white diphtheritic membrane on the gums and bismuth in the urine. Beck's Paste has caused poisonous symptoms.—L. i./13,1039. *See also p.* 240.

Bismuthi Benzoas, **Bismuth Oxybenzoate.**
$C_6H_5{-}CO.O\,(BiO)\,(?) = 346{\cdot}04$.
Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**) thrice daily.

A white powder insoluble in water, containing about 65% Bismuth Oxide. Antiseptic, internally in gastro-intestinal diseases, externally to chancroid, indolent and sloughing ulcers.

Bismuthi Carbonas. *Syn.* **Bismuth Oxycarbonate or Subcarbonate.**
$(Bi_2O_2CO_3)_2.H_2O = 1038{\cdot}106$. *Dose.*—5 to 20 grains (**0·3 to 1·2 Gm.**) Slipule No. 00 holds 10 grains.

May be suspended in an ounce of water by means of a drachm of mucilage of tragacanth or about 6 grains of compound powder of tragacanth. Prescribers should indicate if a suspending agent is required. A light variety of the substance needs no suspending agent.

The following forms an agreeable dose:—

Mistura Bismuthi. *Dose.*—1 ounce.

Bismuth Oxycarbonate 10 grains, Sodium Bicarbonate 10 grain Mucilage of Tragacanth 1 drachm, Compound Tincture of Carda moms 30 minims, Spirit of Chloroform 10 minims, Cinnamon Wate to 1 ounce. **Tablets of Bismuth Carbonate** contain 5 grains, to b crushed and swallowed with a little water.

Ⓟ**Mistura Bismuthi Astringens N. E. H.**
Bismuth Carbonate 2 grains, Tannin 1½ grains, Aromatic Powder of Chal with Opium 2 grains, Water 1 drachm. Dose for a child.

For X-ray Diagnosis of conditions of the œsophagus an stomach large doses are frequently ordered.

' Standard ' Opaque Meal.
Bismuth Carbonate 4 ounces, Lactose 1½ ounces, Water, *q.s.*, to make thin emulsion—less than a tumblerful.—A. C. Jordan, B.M.J. ii./13,1348.

' Homogeneous Bismuth Mixture.'—For use in radiography. 3 ounces (100 Cc.) contain ⅔ ounce (20 Gm.) approximately.
Bismuth Carbonate 120, Gum Arabic 20, Tragacanth 5, Syrup 150, Wate 350. Does not separate into two layers and hence give deceptive effect radiography.—B.M.J.E. i./13,42.

Bismuth Meal.—Vic. Park.
Bismuth Carbonate 3 ounces, Bread, pounded up, 3-4 ounces, Milk 1 ounces.

For several reasons Bismuth Oxychloride is preferable. **Bariu Sulphate** *q.v.* is also used.

Bronchoscopic Insufflation with Bismuth Carbonate of value in radi graphy of the lungs. One ounce can be safely used in adults.—B.M.J.E i./26,35.

GASTRITIS is usually well treated by a dose of Bismuth Carbonate with small dose of Morphine and 2 or 3 minims of Dilute Hydrocyanic Acid.— Whitla, Pract. Med.

In ULCERATIVE COLITIS, Bismuth Carbonate 15 grains to the pint, als Potassium Permanganate 1 in 30,000, useful and soothing. In the lat stages irrigation with Perchloride 1 in 20,000, Zinc Sulphate 4 drachms 3 pints, and Silver Nitrate 5 to 10 grains to the pint, effectual when use alternately. Chlorodyne was beneficial as anodyne.—B.M.J. i./11,864.

Intimately mixed with Liquid Paraffin it is stated to be better tolerate In this way it is not attacked by the hydrochloric acid of the stomach.— Vicario, Jour. Pharm. Chim. 1914,9, p. 458.

HYPERACIDITY is well treated by powders containing Bismuth Carbona 30 grains, Magnesium Carbonate 20 grains, and Sodium Bicarbonate 30 grain —G. Rankin, B.M.J. i./15,1036.

RENAL INSUFFICIENCY well treated with Bismuth Carbonate 50 Gm. daily.— per Pr., May '26,385.

ASCARIS and STRONGYLIS. Large doses, *e.g.*, 30 Gm. in 24 hours, effectiv —Y.B.P., '26,193.

Ⓟ ✱**Sedeff.** (T.M. No. 204175). *Dose.*—1 to 2 drachms in wate Contains Morphine, Bismuth and digestive ferments. A pala able granular effervescent preparation, for use in sickness a derangement of digestive functions.

Ⓟ **Pastillus Bismuthi Carbonatis** (3 grains) **cum Morphinæ Aceta** ($\frac{1}{40}$ grain), *v.* glyco-gelatin.

𝔅 𝔓1 **Collapsubes** (with rectal tube attachment) of Bismuth 20 Morphine ½%, and Cocaine 3% Ointment,—**Unguentum Bismu Morphinæ et Cocainæ**, *Allingham*, with soft paraffin basis, are u ful as an astringent in hæmorrhoids and for allaying irritation.

Liquor Bismuthi et Ammonii Citratis. *Syn.* **Liquor Bismuthi.** (*B.P.* '14.) *Dose.*—½ to 1 drachm (2 to 4 Cc.).

Prepared by interaction of Bismuth Subnitrate with Citric Acid and Water until the product is soluble in Ammonia and then after washing dissolving in Ammonia. Contains 5 grains of citrate=3 grains of oxide of bismuth in 1 drachm. For some data as to manufacture, *see Vol. II.*

Flavoring.—Syl Lavandulæ ; Syrupus Aromaticus.

In following the *B.P.* '14 directions the mixture of Bismuth Subnitrate, Citric Acid and water sets hard and is not completely soluble in ammonia.—F. Penfold suggests alteration of directions.—P.J. ii./16,567. The amount of water should be 60 instead of 20. Place the Bismuth Oxynitrate, Citric Acid and water in a vessel and allow the reaction to proceed.—J. H. Franklin, P.J., i./27,53.

Evaporated to a syrup, spread on glass and dried, it produces :— **Bismuthi et Ammonii Citras, U.S. IX.**

Dose.—2 to 5 grains (0·12 to 0·3 Gm.).

In soluble shining pearly or translucent scales. I Gm. yields not less than 0·46 or more than 0·52 Gm. Bi_2O_3.

Liquor Bismuthi Concentratus, B.P.C. (Double strength of Liquor *B.P.* '14).

Dose.—15 to 30 minims (1 to 2 Cc.).

Dissolve Bismuth Subnitrate 14, with gentle heat in Nitric Acid (**B.P. '14**). 10 previously diluted with an equal volume of water and add Citric Acid 10 dissolved in distilled water 14. Add gradually with stirring Sodium Bicarbonate 17·5 previously mixed with distilled water 14; wash the precipitate by decanting until free from nitrates and dissolve it by adding Solution of Ammonia 12 or *q.s.* Finally add Ammonium Citrate Solution 24 and make up to 100 with water.

Ⓟ **Liquor Bismuthi Sedativus.** *Syn.* ✱**Bisedia.** (T.M. 252630) *Schacht.*

Dose.—1 drachm (4 Cc.) containing bismuth and pepsin with $\frac{1}{24}$ grain morphine hydrochloride, 2 minims of hydrocyanic acid, and 5 minims of tincture of nux vomica.

For acute dyspepsia, vomiting of pregnancy and gastric hyperasthenia.

✱**Bismosal** (T.M. 314185). *Dose.*—½ to 1 drachm (2 to 4 Cc.). Children, 5 to 20 minims (0·3 to 1·2 Cc.). Contains Bismuth as hydroxide in suspension with Salol. In treatment of diarrhœa.

Bismuthi Citras, $BiC_6H_5O_7$=398·04. *Dose.*—2 to 5 grains (0·12 to 0·3 Gm.).

A white crystalline powder, yielding not less than 56 nor more than 58% pure Bismuth Oxide. Insoluble in water and alcohol 90%, but soluble in ammonia. It is astringent and stomachic.

Bismuth Citrate prepared by usual methods is not $BiC_6H_5O_7$, but impure Monobismuthylcitric Acid $H_2C_6H_5O$ (BiO). Alkalis, apparently, do not form salts of this acid but more complex substances.—F. W. Adams, P.J. ii./24,87.

Bismuth Citrate Gauze.—May replace Iodoform Gauze, being non-toxic and without odour. May be left in uterine cavity at least five days and still be free from offensiveness. For use after curettings, in nasal and aural surgery and for burns. Strips, 1, 2 and 3 inches wide, are made, also 36 inches.

Elixir Bismuthi—*Dose.*—1 drachm (4 Cc.).

Bismuth Citrate 1, Distilled Water 6, Solution of Ammonia ¾ c *q.s.* Dissolve, filter and add Simple Elixir *q.s.* to 30.

Ⓟ **Mistura Bismuthi cum Pepsina.**—*Martindale.*

Dose.—1 to 2 drachms (4 to 8 Cc.) diluted.

Contains Bismuth Citrate 2 ounces, Pepsin (soluble) 320 grain Morphine 5 grains, Strychnine 1½ grains, Dilute Hydrocyanic Ac 320 minims, Chloroform 30 minims, Saccharin Elixir 480 minim Rosein Acetate *q.s.*, Water to one pint. This mixture will not deposi

This preparation is retained as mixtures of this kind are frequent ordered, but the action of the Pepsin is seriously interfered with b the other ingredients. (*Cf. our experiments with Pepsin, Vol. II and Bismuth and Pancreatin, infra.*)

Tabellæ Bismuthi et Pepsinæ

Bismuth Carbonate 3 grains, Pepsin 3 grains, in chocolate basi Useful digestive. Compressed Tablets are also prepared.

Tablets Bismuth, Pepsin and Cascara.—*Martindale.*

Dose.—One or two as required after meals.

Bismuth Carbonate 3 grains, Pepsin 3 grains, Cascara Extrac 1 grain. A useful digestive.

Bismuth and Pancreatin.—*Martindale.*

Dose.—1 to 2 drachms (4 to 8 Cc.).

An alkaline stimulant digestive combining the sedative properti of Bismuth with the pancreatic ferment in a compatible form, an being an *alkaline* solution the mixture will promote gastric secretio The peptonising power of the preparation is practically speakin permanent. Our investigations show that Pepsin and Bismut mixtures are mutually incompatible—the activity of th ferment in such mixtures is interfered with by the necessary alkalinit of the Solution of Bismuth unless an acid Bismuth Salt is employe (*v.* Bismuth Tartrate Acid). Pepsin can only operate in a slightl acid solution (equivalent to the Hydrochloric Acid of the norma gastric juice). The alkalinity of Bismuth and the Hydrochloric Aci required with Pepsin are incompatible in a mixture, resulting in th precipitation of Bismuth Oxychloride, hence the more compatib Bismuth and Pancreatin.

The preparation has been found of particular service as a digestive in th irritated condition of the stomach during convalescence from illness.

Ⓟ **Mistura Bismuthi Phenolis et Morphinæ.**

Dose.—1 ounce from 2 to 3 hours after every meal.

Bismuth Carbonate 40 grains, Phenol 2 grains, Solution of Mo phine Hydrochloride 15 minims, Mucilage *q.s.*, Compound Gentia Infusian to 1 ounce.

Duodenal ulcer is relieved by this. For the constipation produce by large doses of Bismuth give **Pilulæ Hydrargyri Subchlorid Rhei, Cascara et Capsicin.**—Guthrie Rankin.

Bismuthi et Cinchonidinæ Iodidum (short name ‘**Bisciniod**’- —*Martindale*). $C_{19}H_{22}N_2O.HI+BiI_3=1011{\cdot}928$.

Dose.—⅙ to 1 grain (0·01 to 0·06 Gm.)

Yellowish red powder, insoluble in ordinary solvents, containing about 20% Bismuth, 40% each Iodine and Cinchonidine.

This substance, containing digestive, febrifuge and antiseptic constituents, should certainly find utility in therapeutics.

Bisciniod Suppositories.

Contain ½ grain (0·03 Gm.) in Cacao Butter basis.

Bismuthi Nitras Crystallisatus, Fr. Cx., P.G. VI. $Bi(NO_3)_3,5H_2O=485·11$.

Dose.—5 to 10 grains (0·3 to 0.6 Gm.).

In colourless deliquescent crystals, which, if dissolved in a small quantity of water, give a solution with an acid reaction, this on further dilution throws out basic bismuth subnitrate. It is practically insoluble in Alcohol 90%, but soluble in cold Glycerin *cf.* Glycerinum Bismuthi Nitratis *infra.* It is astringent and antiseptic, and useful for the diarrhœa of phthisis.

Glycerinum Bismuthi Nitratis.

Bismuth Nitrate, in crystals 1, Glycerin to 4. Diluted 4 or 5 times with Glycerin is a stimulant application in eczema.

Bismuthum Hydroxydatum, Hydrated Bismuth Oxide.

$Bi(OH)_3=260·024$, but the compound is not always uniform.

Dose.—5 to 20 grains (0·3 to 1·2 Gm.).

An amorphous white insoluble powder, but soluble in Sulphuric Acid and Hydrochloric Acid in presence of water and in fixed alkalis in presence of Glycerin. Permanent in the air.

The following are Fr. Cx. directions. Shake Glycerin 150 Gm. with Bismuth Nitrate (cryst.) 100 Gm., add Water 100 Cc. in portions, shaking constantly to prevent formation of the Subnitrate. When dissolved filter if not clear, and pour the liquid, a little at a time, into a mixture of water 150 and 10% Potash Solution 850 Gm. When reaction complete add drop by drop Dilute Sulphuric Acid 100 Gm. (10% approx.—Fr. Cx.) mixed with its weight of water to neutralise, then render the mixture slightly alkaline. Wash the precipitate by decanting until a sample of the wash liquor leaves nothing on evaporation. Collect and dry at 100° C.

Employed in making Basic Bismuth Salicylate.

In an experimental quantity we obtained 45 Gm. of product from above quantities. The theoretical amount is 50% approximately.

Uses.—A substitute for bismuth carbonate.

Lupus erythematosus treated by 12 Bismuth Hydroxide injections of 3·75 grains, two injections a week: cured. Better than Arsenic.—B.M.J.E., ii./27,29.

Bismuthi Oxidum, $Bi_2O_3=466$.

Dose.—5 to 20 grains (0·3 to 1·2 Gm.).

Is prepared by boiling bismuth subnitrate in solution of soda, washing and drying the deposited yellowish bismuth oxide. May be precipitated with acid from an alkaline solution containing glycerin.

Anderson's Ointment.

Bismuth Oxide 1, Oleic Acid 8, White Wax 3, White Soft Paraffin 9. In pruritus.

Bismuthi Oxychloridum, $BiOCl=260·457$.

Dose.—5 to 20 grains (0·3 to 1·2 Gm.).

A non-irritant cosmetic powder, pearl white or '*blanc de perle.*' Given internally it produces a coating on the irritated parts of the stomach or bowels. As insufflation to the larynx ¼ to ½ gr.

Nascent Bismuth Oxychloride.

Pain and vomiting due to catarrh or organic disease of the stomach treate by Bismuth Oxychloride in fine suspension made in nascent state by usin Liquor Bismuthi and Dilute Nitro-Hydrochloric Acid *q.s.* The mixture sug gested is: Liq. Bismuthi 6 drachms, Dilute Nitro-Hydrochloric Acid 1 drachms or *q.s.*, Peppermint Water to 6 ounces. One half ounce in wate *t.d.* shortly before or after meals. (In dispensing, the acid is to be diluted an added last so as to throw out the Bismuth as a dense white cloud.)—H. C Nicholson, Pres., June, '20.

An **Oxybromide** is also made, with similar internal use.

Mucilago Bismuthi. **For "X" Ray Diagnosis.**

Bismuth Oxychloride 1½ to 2 or 3 ounces or more made into a thic paste with Acacia Mucilage for a dose, for determining conditio of the œsophagus and for examining shape, position and motor function of the stomach. A special Bismuth Oxychloride *free fron Nitrate* is made for X-ray work. It is inert in the stomach.

Bismuth in Bread and Milk in proportion of 1½ ounces of Bismuth Oxychloride to ½ pint of bread and milk to form a thick paste—not a liquid—is also employed and is in some respects **more suitable**

In tuberculous joints Bismuth injections are useful for diagnosis an treatment.

See also Bismuth Carbonate *antea* and Radiology Vol. II.

Pessaries or **Suppositories** may be made with Oil of Theobroma containing 10 grains (0·6 Gm.).

Unguentum Bismuthi Oxychloridi.

Bismuth Oxychloride 1, White Soft Paraffin 15.

Is useful for anointing the speculum for vaginal examinations.

Unguentum Bismuthi Compositum, Plaistow.

Bismuth Oxychloride 2 drachms, Dilute Hydrocyanic Acid 2 minims, White Paraffin Ointment 1 ounce.

The **Oxyiodide** has been applied to ulcerating sores and injecte in suspension, 1 in 100 of water for gonorrhœa; also as an ointmen for rectal affections. Internally for ulcer of the stomach.

Bismuthi Salicylas, **Bismuth Oxysalicylate, or Subsalicylate** $C_6H_4.OH.COO.BiO = 362.04$ (*B.P.* '14). **U.S., Jap., P. Ital. IV. P.G. VI., Ph. Ned. V. and P. Helv.** (last two with method o making).

Dose.—5 to 20 grains (0·3 to 1·2 Gm.).

A white powder, insoluble in water, alcohol, and glycerin, yields o incineration about 64% of Bismuth Oxide. Has been used wit advantage in some forms of diarrhœa, typhoid fever and gastri catarrh, and as a substitute for iodoform. A good intestinal antiseptic.

Bismuth Salicylate Sterules, 2 grains (0·12 Gm.) in 1 Cc. of Steril Olive Oil are prepared.

Syphilis well treated. Better tolerated than Mercury. Can be used i cases with marked renal involvement.—per Jl.A.M.A. ii./25,223.

Criticism is, however, that this insoluble compound is dangerous by injection *v.* Ref. under Sodium Potassium Bismuthyl Tartrate.

For Notes on Chemical Examination see Vol. II.

Tablets, 5 grains (0·3 Gm.). *Dose.*—1 to 4.

Suppositories of Bismuth Salicylate, 10 grains.

A useful astringent in dysentery.

Bismuthum Subsalicylicum, Basic (Fr. Cx.).

$C_6H_4.OH.COO.Bi(OH)_2=380·056$.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

An amorphous anhydrous insoluble white powder neutral to Litmus, incompatible with Acids. To prepare, warm without boiling Hydrated Bismuth Oxide (*q.v.*) 158 or as much as corresponds to 150 Gm. Bi_2O_3 with Salicylic Acid 100 previously mixed with water 1,000. The mixture should be finally slightly acid. After cooling collect and wash rapidly, and dry at not exceeding 80° C. In an experimental quantity which we prepared we found a distinct proportion of free Salicylic Acid.

Bismuthi et Cerii Salicylas.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

For sickness, diarrhœa, dysentery, and ulceration of the bowels.

Bismuthi Sulphocarbolas *vel* **Sulphophenas.**

Dose.—4 to 8 grains (**0·25 to 0·5 Gm.**). in cachets.

A red-tinted slightly soluble powder used in intestinal affections.

Bismuthi Subnitras, Bismuth Oxynitrate, Magisterium Bismuth (*B.P.* '14), **Ph. Ned. V.**, P. Helv., P. Ital., P.G. VI.

$Bi\ ONO_3H_2O=305·024$.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

P. Jap. gives method of making—*i.e.*, Bismuth 1, Nitric Acid (1.2 Sp. Gr.) 5, solve and allow to crystallise, then take the crystals 1, water 4, and add boiling water 21. Pour off, wash with water 25, and dry at 30° C.

Yields (*B.P.* '14, P. Jap. and P. Ital.) 79 to 82% Bi_2O_3.

For pharmaceutical purposes it is usually $6Bi_2O_3.5N_2O_5.9H_2O$ (79·8% Bi_2O_3).—C. E. Corfield and G. Short, P.J. ii./24,80.

Incompatible with alkaline carbonates, also decomposes Potassium Iodide, and incompatible with Tannin and Sulphur.

Best suspended in aqueous vehicle by Compound Tragacanth Powder, 1 drachm to 8 ounces, or by powdered Gum Acacia or with half its weight of Starch Powder.—P.J., i./26,96. The powder may also be intimately mixed with Liquid Paraffin. This avoids decomposition into nitrite in the stomach. *cf.* Bismuth Carbonate.

Uses.—In gastric ulcer and dysentery as an intestinal antiseptic, and occasionally as a dusting powder in eye work. During the war it was much used to wounds in the form of 'B.I.P.P.'

Gastric ulcer well treated by Bismuth Subnitrate rubbed into a paste with Liquid Paraffin. This is a good vehicle for Bismuth, undoing its constipating effect.—L. J. Picton, B.M.J. ii./17,617.

As a dusting powder for wounds it has caused poisoning.

Syphilis.—Bismuth Subnitrate as effective as any other Bismuth compound. Good results with following injection: Bismuth Subnitrate 10 Gm., Novocaine Nitrate 1 Gm., Sterile Almond Oil 100 Gm., the dose being 1 Cc. (0·07 Gm. Bismuth) every 3rd day.—E. Sonnenberg, D.M.W., Sept. 11, '25,1530; per Pres., Sept. '26,329.

Injectio Bismuthi Subnitratis.—Beck's Bismuth Paste. For X-ray Examination of fistulæ (*cf.* also Bismuth Oxychloride).

(*a*) For Diagnosis and Early Treatment.—Place Bismuth Subnitrate 1 in a mortar sterilised by burning a little spirit in it and add in portions hot melted Soft White Paraffin 2.

(*b*) For Late Treatment.—Bismuth Subnitrate 6, White Wax 1, Hard Paraffin 1 (M. pt. 120° F.), Soft White Paraffin 12. Prepare on similar lines to the last.

The (*a*) form was originally injected to diagnose the extent of chronic tuberculous sinuses. It was found in addition, however, to have marked curative effect. Injections with a glass syringe are made after melting and mixing. The syringe must be sterilised dry, and the plunger dipped in sterile oil before charging.—Beck, 'Fistulous Tracts, Tuberculous Sinuses and Abscess Cavities.'

Modifications have been introduced, *e.g.*, the following :—Bismuth Oxychloride 1, Soft White Paraffin 1½, Liquid Paraffin 1½, for injection into sinuses.

By X-ray examination, sinuses so injected can be localised. When employed for diagnostic purposes with subsequent immediate operation there is no danger, but large quantities should not be left *in situ*.

Three ounces of (a) injected at the knee, and later 4 ounces further caused obvious poisonous effects. Caution is necessary when using for diagnostic purposes.

The action of the Bismuth is thought to be bactericidal, chemotactic and astringent. Mechanical action of the paste is also good.

Pasta Bismuthi et Iodoformi. *Syn.* **"B.I.P.P."**

Mix Bismuth Subnitrate 1, and Iodoform 2, and stir in Liquid Paraffin 1 or *q.s.* to soft butter or cream consistence, and finally rub down on a slab with a spatula.

A Paraffin Base of composition : Paraffin melting point 45° C. 19 parts, and Liquid Paraffin (Sp. Gr. 0·880) 40 parts suggested when making a *soft* "B.I.P.P."—S. Dunstan, B.M.J. ii./17,505.

Since the advent of "B.I.P.P." it has been possible to treat large infected wounds in such a way that they require no special drainage that they can be safely closed by sutures at any period of their progress, and the dressings used for them can be left on from one to six weeks with a knowledge that they are making steady progress To avoid risk of Bismuth or Iodoform poisoning *smear the surface of the wounds* and rub in "B.I.P.P.," *removing any excess.*

In ***dressing a wound*** (i.) clean the skin and surrounding area with gauze wrung out of 1 in 20 Carbolic Lotion—usually under open ether anæsthesia.

(ii.) Open the wound freely and, if possible, sufficiently to inspect the cavity and cleanse with dry sterile gauze mops, using a Volkmann's spoon, and remove foreign bodies.

(iii.) Mop out with cotton-wool mops soaked in Spirit and dry.

(iv.) Fill up with 'B.I.P.P.' by drawing backwards and forwards through the track of the wound strips of gauze covered with the paste. Remove a excess, leaving only a thin covering over the wounded surface. Dress wit sterile gauze and cover with an absorbent pad which is held, if possible, wit sticking plaster and bandage. This requires no change for days or week if patient is free from pain. If discharge comes through, the stained par must be soaked in spirit and a gauze dressing wrung out of the same applie as a further covering.

(v.) In redressing, the wound is covered with a dossil of wool soaked in spir and the sticky, dirty-looking discharge is wiped off the surrounding ski until it is clean.

For fresh wounds, when infective gangrene is still a serious possibilit free drainage must be employed. There is little danger of Iodoform poisoning. Except in head wounds there was no spread of septic infection, n cellulitis nor abscess formation. The method makes possible the healing b first intention under infrequent dressings. Acute abscesses opened, cleane filled with 'B.I.P.P.,' and closed by interrupted sutures can heal by first intention without further pus formation. It appears safe to plate compound fractures by the method described.—Rutherford Morison, L. ii./16,268.

The fresher the wound is the better it reacts to the treatment. Wounds have been closed without tube or other drainage than is allowed for between *interrupted* sutures, not too close together. From these the bacteriologist has cultivated *B. Perfringens*, *Tetanus* and a variety of other anaerobic organisms, but the results have always been good. Thick sterile silk sutures rubbed all over with 'B.I.P.P.' are better than silkworm-gut. Compound fractures of all the bones can be treated with as great ease as simple fractures. Cases of compound fracture of ankle, gun-shot and other wounds well reported on.—Rutherford Morison, B.M.J. ii./17,503.

It combines a maximum amount of rest to the wound, a persistent storage of inhibitory antiseptic and a minimum amount of attention but is not free from risks.—Sir G. H. Makins—Hunterian Oration, B.M.J. i./17,216; L. i./17, 252.

OSTEOMYELITIS.—The more frequent use of 'B.I.P.P.' urged in treatment.—B.M.J.E., i./26,20.

See also '**Wounds.**'—Therapeutic Index.

Enema Bismuthi et Sodii Salicylatis.

Bismuth Subnitrate 3 drachms, Sodium Salicylate 2½ drachms, Psyllium Seed Mucilage to 1 pint.

Colitis, the treatment of, by Revelliod's method (modified).

Empty the bowels by enemata of warm water twice daily for three days—on the fourth day inject the above. Action of the bowels must be discouraged after the injection, as the medicament should be retained for two days, if possible, to permit of absorption.

During the injection the patient should lie upon the left side with the pelvis raised 2 or 3 inches. This treatment has of course no effect upon enteritis alone or complicating (? originating) colitis; consequently a modification is necessary.

Pilula Bismuthi-Sodii Salicylatis cum Salol.

Syn. COMPOUND BISMUTH PILL.

Dose.—Two immediately after each of 6 consecutive meals, then discontinue for two days and repeat in the same manner.

This pill contains in the centre Bismuth Carbonate 2½ grains, coated thinly with Gelatin, and around this is a layer of Sodium Salicylate 2 grains, covered finally with Salol 1½, 2½ or 3 grains, or as desired (*the Salol to be applied pure by means of heat only*).

It was devised to ensure its reaching the part of the intestine affected by the catarrh. It is coated with acid-resisting material and it dissociates on meeting the alkaline intestinal juice. The coating of Salol is varied in thickness according to the distance from the pylorus which the physician may determine the beginning of the catarrhal state to be. While 1½ grains of Salol permits the medicaments to reach the junction (approximately) of the upper and middle thirds of the ileum, 4 grains will, in a large proportion of cases, carry the pill through the whole length of the intestines and cause it to be discharged with the fæces. The well-known coating effect of the Bismuth Carbonate on the inflamed mucous surfaces is enhanced by the properties of the Sodium Salicylate. The Bismuth remains *in situ* for from 8–10 days.

Bismuth Subnitrate Tablets, are made 5 to 10 grains.

Ⓟ **Lotio Bismuthi Mid. H.**

Bismuth Subnitrate 5, Zinc Oxide 20, Mercuric Chloride 0·16 Glycerin 10, Hydrogen Peroxide Solution 120, Water to 300.

As a stimulant in rosacea and pigmentary disorders.

B P1 **Pulvis Bismuthi Compositus.** *Syn.* INSUFFLATIO BISMUTHI ET MORPHINÆ. FERRIER'S SNUFF, PULVIS BISMUTHI CUM MORPHINA.

Bismuth Subnitrate 180, Morphine Hydrochloride 1, Powdered Gum Acacia 60.

From 1 to 2 drachms may be used as snuff in 24 hours for catarrh. For acute coryza, add powdered cubebs. It may cause drowsiness for some hours in susceptible patients.

Pulvis Bismuthi Compositus L.H. (*Caution, cf.* Ferrier's Snuff *supra*).

Dose.—1 drachm.

Bismuth Carbonate 1, Heavy Magnesium Carbonate 2½, Sodium Bicarbonate 2½. An antidyspeptic powder.

Bismuthi Oxy-Iodogallas. **P. Jap. IV., P. Helv., Ph. Ned. V., P.G. VI.**

$C_6H_2(OH)_3COOBi.OH.I$=521·78.

*AIROL, T.M. 181257 of 1894. Renewed 1922. *Syns.* AIROFORM, AIROGEN.

Manufacture (from specification of expired Patent). Bismuth oxyiodide derived from 9·5 Kilos of Cryst. Bismuth Nitrate is washed and stirred with water. 3·4 kilos Gallic Acid are added until red colour changes to greyish-green. Collect, wash and dry at moderate heat. Or, Bismuth Gallate (Dermatol), 10 kilos are treated under heating with 3·1 kilos of Hydriodic Acid until of green colour. Wash and dry.

A light greyish-green powder, odourless, non-irritant. Used as ointment for ulcers, boils, whitlows, chancres, and intertrigo. Also as dusting powder, *e.g.*, for gonorrhœal ophthalmia.

Suppositoria Hæmorrhoidalia.

Bismuth oxyiodogallate 6, Resorcin 1·5, Zinc Oxide 6, Balsam of Peru 1·5, Yellow Beeswax 0·0075, Sesame oil 1·5, Oil of theobroma 19 Gm. Divide into twelve suppositories.

Sanusin *Sempules (T.M. 329438) **contain Resorcin, Boric Acid, Balsam Peru, Zinc and Bismuth Carbonate—useful in treatment of hæmorrhoids.**

Bismuthi Subgallas, $C_6H_2.(OH)_3CO.O.(BiO), H_2O$ or $Bi(OH)_2C_7H_5O_5$ =412·056 *Syn.* *DERMATOL; U.S. X. 52–57% Bi_2O_3. P. JAP. PH. NED. V. and P. HELV. GALLATE DE BISMUTH. FR. CX. 56·45% Bi_2O_3 (with directions for making). P.G. VI. (46·6% Bismuth).

PATENT 6234 of 1891 became void in the 11th year. Now public property. *DERMATOL (T.M. 215949).

Manufacture.—May be prepared according to our investigations in several different ways:—(1) By mixing the freshly precipitated Hydroxide obtained from Bismuth Nitrate (crystal) 484 with Gallic Acid 188, dissolved in warm Alcohol, and warming the mixture until the colour is light yellow and the supernatant liquor is hardly acid. Collect and wash with lukewarm water. (2) By using Bismuth Carbonate 258, Gallic Acid 188, and Water 2,000, heating until interaction has occurred, or (3) By using Bismuth Subnitrate 304, in place of the Carbonate. In this case the Gallic Acid must be used as Sodium Salt.

On the whole we find the No. (2) method is best. The colour is lemon yellow and the Bi_2O_3 content we found approximates theory—56·4%.—W. H. M., 1917.

The FR. CX. method is also satisfactory: Dissolve Bismuth Nitrate *Cryst.* 100 Gm. in Glacial Acetic Acid 200 Gm. Dilute with water 500 Cc. and add with stirring Gallic Acid 37 dissolved in water 1,500 Cc. Wash the p.p. until the liquor is no longer acid to litmus. Dry at not exceeding 60° C.

Average dose (U.S.)—15 grains (**1 Gm.**).

An odourless, yellow, insoluble, non-irritant antiseptic dusting powder, employed alone or with starch.

Incompatible with alkaline sulphur compounds.

Given internally for diarrhœa in doses of 30 to 90 grains daily. Emulsion of Bismuth Subgallate 2, Gum Acacia 2, Water 25, has been used in gonorrhœa, with good results.

In ulcerative colitis an emulsion may be used to adhere to the mucosa; also of value after pile operations. Promotes healing.—W. S. Handley.

YAWS.—Dermatol intramuscularly gave as good results as the Arsenics.—per Jl. Trop. Med., Jan. 15, '25,35.

Collapsubes, with catheter attachment, of **Bismuth Subgallate Ointment**, 10%, with paraffin basis, are useful in gonorrhœa: this ointment is also good for burns and eczema.

Carbassus Bismuthi Subgallatis. BISMUTH SUBGALLATE GAUZE.

To prepare, use an emulsion of Bismuth Subgallate, ½ to 1 of Glycerin to 2 of Alcohol (90%) and proceed in the customary manner (*cf.* Sterilised Dressings)—the final strength being 10 to 20% of the Bismuth in the gauze as required. For packing cavities.

Bismuthi Tannas. *Dose.*—10 to 30 grains (**0·6 to 2 Gm.**).

A yellow powder insoluble in water, is astringent, and useful in diarrhœa and dysentery. F.N. 1911 and P. HUNG. give method of making.

Bismutose (*cf.* German patent 117269). *Dose.*—15 to 30 grains for children, adults by the teaspoonful. A compound containing about 20% of bismuth with 60% of albumen; useful in gastric ailments.

Naphthol-Bismuth. BASIC BISMUTH BETA-NAPHTHOLATE.

$Bi_2O_2(OH)C_{10}H_7O = 610·064$.

Syn. ✱ORPHOL. TRADE MARK 190732.

PATENT 13291/1892 and 15361/1894. The first remained in force the entire period. The second became void in the 7th year. Now public property. U.S. Patent is 516358/1894.

Dose.—10 to 30 grains (**0·6 to 2 Gm.**).

Manufacture:

We have made a compound of this kind by interaction of a Sodium Naphtholate solution made with Beta Naphthol 144 (one molecule) and Sodium Hydrate 120 (3 molecules) with Bismuth Citrate 397 (one molecule) in the form of a paste with water.

This method produces a light buff coloured powder, which gave on ignition approx. 80% Bismuth Oxide. Theory demands 76·3%.

A useful antiseptic to the stomach and intestines, astringent.

Phenol-Bismuth.

Dose.—10 to 30 grains (**0·6 to 2 Gm.**).

Preparation:—

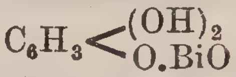
The method advised is to dissolve Bismuth Oxynitrate 60, in 70% Nitric Acid 45, diluted with water 150, and to add this very slowly to Sodium Hydroxide 42 and Phenol 20 in water 750 with stirring and wash with cold water. The body obtained yielded on analysis 14·76% Phenol and 81·93% Bismuth Oxide. The exact formula of the compound is therefore uncertain. Products with the highest Phenol content are obtained by precipitation from neutral solution in the cold. The figures do not agree with $Bi(OH)_2C_6H_5O$.—C. E. Corfield and G. R. Boyes, P.J. i./21,483.

A white powder, insoluble, containing about 20% of phenol, combined with bismuth oxide. Acts slowly on the digestive tract and does not cause carboluria. Has a similar action to last preparation.

Krebisote. Probable approximate composition: $C_6H_3(CH_3)(OCH_3)O.Bi(OH)_2$.

Dose.—3 to 15 grains (0·2 to 1 Gm.).

Greenish yellow or brown powder darkening on exposure to light and air. Yields 60-63% Bismuth Oxide on ignition. A definite compound of Creosote and Bismuth. It is completely soluble in Chloroform. When treated with weak Hydrochloric Acid at body temperature, it is decomposed and Creosote is liberated. In ointment form in eczema and as prophylactic against dysentery. The two component parts—the Creosote and the Bismuth acting together are thought to have distinct advantage.

Pyrogallol-Bismuth. 

$C_6H_3{<}^{(OH)_2}_{O.BiO}$ or

$C_6H_3(OH)O_2BiOH = 350{\cdot}04$ has internal action similar to Salol.

Dose.—2 to 8 grains (0·12 to 0·5 Gm.).

ALKALI BISMUTHYL TARTRATES

And allied preparations for Injection in Syphilis.

In addition to the Alkali Bismuthyl Tartrates, Suspensions of Metallic Bismuth, Bismuth Subnitrate, Salicylate, Hydroxide and Oxide are used.

The **Alkali Bismuthyl Tartrates** used medicinally may be roughly divided into two classes, according to the method of their manufacture and medicinal use. (*cf.* Corfield and Adams, P.J. ii./23,82.)

(1) 'NEUTRAL' compounds, usually termed '**Bismuthyl Tartrates**' or '**Tartrobismuthates,**' which are either soluble or insoluble in water, and are used for injection in protozoal diseases. They are prepared by dissolving Bismuth Oxy-Tartrate in alkali, the Alkali Bismuthyl Tartrate being obtained as a powder by evaporation or by precipitation with Alcohol.

(2) 'ACID' preparations, frequently described as 'Bismuth Tartrate Soluble,' usually occur as colourless scales, which give an acid solution in water; these are employed with Pepsin for digestive complaints. They are obtained by treating Bismuth Hydroxide with a solution of the alkali acid tartrate, filtering and evaporating.

Sodium Bismuthyl Tartrate, Neutral. *Syn.* SODIUM TARTROBISMUTHATE. ***For Injection.***

Dose.—As for Sodium Potassium Bismuthyl Tartrate *postea.*

Manufacture.—Bismuth Oxytartrate is first prepared by the method of R. C. Cowley (C.D. i./13,312). Dissolve Bismuth Subnitrate 70 Gm. in Nitric Acid (Sp. Gr. 1·42) 57 Cc. diluted with an equal volume of water, add Sodio-Potassium Tartrate 64·5 Gm. dissolved in a little water, then Sodium Bicarbonate 57 Gm., also in solution. Heat to drive off CO_2. Filter and thoroughly wash the precipitate of Bismuth Oxytartrate.

This gives a product which, when dried, contains only about ½% of Bismuth Subnitrate and has a Bismuth content of about 57%, corresponding to the formula $Bi_2O(C_4H_4O_6)_2$. The washed precipitate of Bismuth Oxytartrate is dissolved in 115 Cc. of 2 N/1 NaOH and the solution, after filtration we find is best run into fifteen times its volume of 95% Alcohol to precipitat the compound. The precipitate is collected and dried at 50° C.

We find that the substance so prepared corresponds approximately to the formula $C_4H_4O_6(BiO)Na$, but this agreement seems to be only accidental since the composition of the product can be altered by varying the strength of Alcohol used for precipitation. Thus it seems probable that the substance is in reality either more complex, or else a mixture of several compounds. Other workers have arrived at a similar conclusion.

R. C. Cowley (*loc. cit.*) dissolves the Bismuth Oxytartrate in normal Caustic Soda, evaporates and scales. On experimenting, we find the Alcohol precipitation preferable, since evaporation gives an insoluble product, which only gives a clear solution on the addition of a little more alkali.

The compound occurs as a white powder, ***soluble*** 1 in 6 parts of water, giving a nearly neutral solution, and containing about 53% of Bismuth.

Uses.—These are included under Sodium-Potassium Bismuthyl Tartrate.

Sodium Bismuth Tartrate, Acid. *Syn.* BISMUTH TARTRATE SOLUBLE.

Dose.—2 to 5 grains (**0·12** to **0·3 Gm.**) *per os.*

Manufacture.—This substance is formed by either hot or cold digestion of freshly precipitated Bismuth Hydroxide with a solution of Sodium Acid Tartrate, the solution being filtered and scaled. In no case could a neutral compound analogous with Tartar Emetic be isolated, the resulting preparation always contains Sodium Acid Tartrate.

It is usually obtained in the form of colourless scales which give an acid solution in water. Commercial samples examined contained from 30—45% of Bismuth, and from 15—25% of Sodium Acid Tartrate, calculated from the acidity. A compound of this kind is, we find, compatible in moderate amount with Pepsin (*vide Vol. II.*).

Uses.—For digestive complaints, in conjunction with Pepsin, the acid solution favouring the action of the enzyme.

Liquor Bismuthi Tartratis.

Dose.—½ to 1 drachm (**2** to **4 Cc.**).

Dissolve Bismuth Tartrate Soluble 1040 grains, in water 10 ounces, and Chloroform 20 minims, in Alcohol 40 minims, mix and make up to 20 ounces.—T. D. Morson and J. Harpham, C.D. ii./12,947.

Potassium Bismuthyl Tartrates.

These are similar to the corresponding Sodium salts and are prepared by similar methods.

'Neutral' Potassium Bismuthyl Tartrate is a white soluble powder containing about 50% of Bismuth.

'Acid' Potassium Bismuthyl Tartrate is obtainable in the form of colourless scales containing about 38% of Bismuth, and acidity equivalent to 10 to 15% of Potassium Acid Tartrate.

Sodium Potassium Bismuthyl Tartrate. *Syn.* SODIUM POTASSIUM TARTROBISMUTHATE.

This substance occurs almost exclusively in the form of the water soluble, neutral preparation used for injection purposes.

Dose.—3 grains (**0·2 Gm.**) *intramuscularly* every 3 or 4 days, repeated until a total of 2 to 3 Gm. has been given. (The compound is given in 10% suspension in sterile Oil.) Subsequently a single weekly injection of 0·2 to 0·3 Gm. may be given, or the treatment may be suspended for a month and then started again, if necessary.

Manufacture.—Commercial samples which we have examined show a considerable variation in the Bismuth content, ranging from 30 to 60%.

By dissolving Bismuth Oxytartrate in a 2 N/1 solution of equimolecula parts of Caustic Soda and Potash with subsequent precipitation with Alcoho as described under Sodium Bismuthyl Tartrate, a preparation is obtaine containing about 50—52% of Bismuth. The above method appears to giv substances which are nearly uniform as regards Bismuth content, but as i the case of the corresponding Sodium Bismuthyl Tartrate the products ar probably a mixture of complex compounds.

A white powder, ***soluble*** about 1 in 2 parts of water, giving neutral solution.

Uses.—*This*, according to some authorities, is the compoun which is to be used in syphilis, but in all probability the differenc in effect between a Sodium Bismuth Tartrate and a body con taining also Potassium is negligible.

Pharmacology.—Sazerac and Levaditi made experiments o rabbits in the treatment of experimental syphilis employing the compound made according to Cowley's formula. They found a dose of 0·01 Gm. per kilo intramuscularly caused disappearanc of the treponema. This, of the various compounds tried (Bismut Citrate, Lactate, Subgallate, etc.) gave the speediest results. Thera peutically, the treponema disappeared from a chancre after the second injection, with subsequent healing. In the secondary stage, eruptions or mucous patches clear up quickly. Very favourable results have been obtained in the tertiary stage.—Jl. des Praticiens, Feb. '22, per Pr.

The compound in various forms has been considerably employed both abroad and in this country.

Caution. *Bismuth preparations, in general, are apt to cause gingivitis and stomatitis. Care must be taken with the mouth.*

The drawbacks of Bismuth medication are :—

(1) Local pain; avoided by use of suitable preparations and careful technique.

(2) Effects on the skin and mucous membrane, such as stomatitis, which are however uncommon.

(3) Effects on digestive tract and kidneys, such as colitis and nephritis have occasionally been reported.

(4) General effects, such as headache and depression.

It is not advisable that Bismuth should replace Arsenic in all cases, being specially indicated in cases resistant to, or intolerant of, Arsenic. Authors recommend a combined treatment with Arsenic and Bismuth, giving Mercury an accessory position.—Emory and Morin, Paris Med. Dec. 22, 509, per Pres. Feb. '23. The urine should be watched during treatment.—B.M.J.E., ii./22,58. Bismuth compounds contraindicated in heart disease, being liable to induce weakness and irregularity of action.—per Pres. Jan. '24,57.

Bismuth compounds in general are much less toxic intramuscularly than intravenously.—Raiziss & Severac, Arch. Derm & Syph., Nov. '25,661, per Pres., Sept. '26,327.

Peripheral polyneuritis following injection of metallic Bismuth preparation. Risk of injections of Bismuth preparations when kidneys are damaged.—M. Critchley, Brit. Jl. Ven. Dis., Jan. '26,83, per Pres., Sept. '26,330.

Many cases of albuminuria recorded following Bismuth administration.—B.M.J.E., i./25,77.

Injections of metallic Bismuth are dangerous—probably true, though to less extent, of Bismuth Oleate. Bismuth Salicylate is also dangerous, and should be replaced by a more soluble salt, *e.g.*, Potassium Bismuth Tartrate intragluteally once a week. Injection of insoluble Bismuth Salts twice weekly is open to question, as only a small amount is absorbed at most and too frequent deposits may lead to cumulative action.—per Jl. Trop. Med., June 1, '26,161. See also G. A. Masson, Jl. Ph. & Exp. Ther., Dec. '26,121.

Cowley's compound in 10% suspension in Olive Oil employed. Dose intramuscularly 2 to 3 Cc. Soluble salts are at least 10 *times as toxic* when given *intravenously* as when given *intramuscularly*. Liquor Bismuthi et Ammon. Cit. B.P. 0·5 or 1 Cc. subcutaneously had no general effect, but on repetition a black line formed on the gums with sometimes a stomatitis. *Subcutaneous* injections are in general less safe than *intramuscular*. Intravenous injection, especially with 2 Cc., gave signs of poisoning, nausea and copious diuresis.—H. B. Day, L. ii./22,328.

SYPHILIS.—Bismuth Sodium Tartrate and Bismuth Potassium Tartrate curative. The compound suspended in oil. *Intramuscular* injections to be given, not hypodermic or intravenous. Wassermann reaction affected in a percentage of cases. Dose 0·2 Gm. every other day or 0·3 Gm. every three days. Total dose 1 to 1½ Gm. Stomatitis seen, but milder than Mercurial.—Sazerac and Levaditi, B.M.J.E. i./22,9. See also B.M.J. i./22,443.

The Bismuth is widely distributed and rapidly eliminated.

The Wassermann Reaction is changed.—L. i./23,39.

YAWS in Kenya Colony well treated.—R. Howard, T. Roy. S. Trop. Med., Mar. '23,437. There is a difficulty in determining whether a case should be diagnosed as syphilis or yaws, the administration of Mercury will often clear up the doubt, as Mercury has no influence on yaws.—A. Castellani.

Excellent results obtained by use of Bismuth salts in yaws.—Jl. Trop. Med., Aug. 15/20,233.

Bismuth Oxides must be used with caution. May produce abscesses. A Bismuth course may consist of (a) a soluble compound in small repeated doses, (b) precipitated Bismuth metal in aqueous suspension, for rapid results, (c) inorganic insoluble compounds, chiefly Iodoquinates for prolonged and tonic treatment.—R. Barthelemy, Urol. & Cut. Rev., May '26,310, per Pres., Sept. '26,328.

Four doses each of 4 grains of Bismuth Sodium Potassium Tartrate were usually sufficient to clear up all symptoms of yaws.—C. R. Steel, Jl. Trop. Med., Nov. 1/27,274.

Pharmacology of Bismuth Salts.—An extensive investigation into the toleration of animals towards injections of Bismuth in various forms. The soluble **Sodium Bismuth Citrate**, containing 65·8% Bismuth appeared to be less toxic in rabbits than Tartrate compounds.—C. S. Leonard, Jl. Ph. Exp. Ther., July '26,89-130.

Note on manufacture of Bismuth Sodium Citrate. Its solution can be boiled without decomposition.—Jl. Ph. & Exp. Ther., Sept. '27,353.

Tartro-bismuthate of Sodium and Potassium too painful for general use. Bismuth slow in healing active signs of disease in comparison with Arsenic. Bismuth therapy superior to Mercury for primary, secondary and tertiary lesions of syphilis, when either is combined with Arsenobenzol.—Maj. A. T. Frost, Med. Soc. for Study of Ven. Dis., L. i./24,901.

The place of Bismuth in the treatment of Syphilis. Its action is more rapid on *S. pallidum in vivo* than Mercury but not so rapid as Salvarsan. It influences lesions as rapidly as Salvarsan and more rapidly than Mercury. It is free from danger in therapeutic doses—best given as metallic Bismuth in Isotonic Glucose.—David Lees, B.M.J., ii./27,298.

The tartrates and oleate are toxic to rabbits, causing necrosis of the tubules of the kidney. The maximum tolerated dose is about 0·2 Gm. per kilo intravenously. Precipitated Bismuth Metal has a tolerated dose of 0·4 to 0·5 Gm. per kilo.—B.C.A., '26,A975.

Bismuth with Soamin.

An injection consisting of 3 grains Bismuth Sodium Tartrate and 2 grains Soamin, in 1 Cc. water, given every 2nd day, almost invariably cleared up yaws in 6 days, and 75% of 538 cases of tertiary or congenital syphilis were completely healed in 12 days.—J. O. Shircore, L. ii./26,43.

300,000 cases of yaws treated with Bismuth since 1922. The Soamin and Bismuth Sodium Tartrate preparation costs less than a penny per dose.—J. O. Shircore, L. ii./26,43. Routine treatment for yaws in Kenya Colony—in two districts alone over 36,000 cases treated during 1923. Dose 3 grains intramuscularly in 2 Cc. Distilled Water: smaller dose for children. Enormous saving compared with Novarsenobenzol.—A. R. Paterson, Int. Conf. Trop. Am., '24,584.

PREPARATIONS OF COMMERCE:—

(*Stovarsol compound of Bismuth, see Stovarsol.*)

'Bismutol' Sterules contain 3 grains (**0·2 Gm.**) of SODIUM POTASSIUM BISMUTHYL TARTRATE in **2 Cc.** (30 minims) of sterile Oil. For use intramuscularly.

A Sodium Potassium Tartrobismuthate containing approximately 50% Bismuth and giving a neutral aqueous solution.

Alternatively 1 Cc. doses of 10% aqueous solution may be employed every 2 or 3 days—the course being 10 to 20 injections.

Trepol is stated to be a preparation of similar composition.

Trepol is essentially basic Bismuth Carbonate and not Sodium Potassium Bismuth Tartrate, as stated. Neotrepol—the dose of metallic Bismuth in different ampoules was inexact. Neither compounds admitted to N.N.R.—Y.B.P., '26,223.

Said to cause rapid disappearance of the spirochætes in syphilitic chancres and healing of lesions in 6 to 20 days.—L. i./22,1001.

Good effects from intragluteal injections twice weekly of 1 to 2 Cc. of the 10% emulsion.—B.M.J.E. ii./22,73.

PSORIASIS successfully treated by intramuscular injections. Complete retrogression of lesions in 12 and partial retrogression in 9, out of 21 cases. No local treatment.—L. ii./26,559.

✱Luatol (T.M.424118) is a Tartrated Bismuth preparation.

Dose.—1 Cc. of the aqueous solution containing 0·1 Gm. of the compound repeated every 2 days. A course consists of a series of injections of from 10 to 20 Cc. Alternatively, 2 Cc. may be given at one time, but in this case injections should only be repeated after 4 or 5 days. The preparation is also given suspended in oil. For the first 3 injections 3 Cc. of a 10% suspension are used, and for the 3 following, the dose is to be reduced to 2 Cc. per injection. Injection, in this instance, is given on an average every 4 days. If required, the treatment may be continued at the rate of one injection of 2 Cc. every 6 days, until healing of the lesions is obtained, or until Wasserman Reaction is negative. A further series of injections can be made after an interval of one month.

Gingivitis is said to be less frequent with aqueous than with oily solutions.

Ampoules are made for intramuscular injection.

METALLIC BISMUTH, BISMUTH OXIDE AND OTHER COMPOUNDS FOR INJECTION.

Metallic Bismuth Sterules contain 0·2 Gm. in 1 Cc. of 5% Glucose solution. *Dose.*—0·5 to 1 Cc. intramuscularly into the buttocks.

✱Bismostab (T.M. 447724). *Dose.*—0·5 to 1 Cc.

A preparation of 20% Bismuth in 5% Glucose solution. Painless and non-irritant.

Neo-trépol is a 10% suspension in a sterile isotonic solution. Given intramuscularly in doses of 1·5 to 2 Cc. every 3 or 4 days. —C. Levaditi, L. i./23,639.

Bismuthyl is a similar preparation in 10% suspension in a glucose medium. *Dose.*—2 Cc. intramuscularly every 5 days until 12 to 15 doses have been given.

Metallic Bismuth is the preparation of choice among Bismuth preparations. Non-toxic, absorption rate uniform, and action steady. In syphilitic affections of the heart and respiratory system Bismuth is the only drug to fall back on. Only danger to avoid is not to inject drug into blood stream, as it causes paralysis and death within two hours.—C. F. Chenoy, I.M.G., Nov. '26,536.

Soluble compounds are more toxic and painful than insoluble Bismuth preparations. Metallic Bismuth is the least toxic—should be given by deep subcutaneous route. Poisoning may occur in spite of absence of blue line.

Tertiary lesions of mouth and tongue and symptoms of tabes respond particularly well. Valuable in nephritis, jaundice and organic disease where Mercury and Arsenic are not suitable. Not an efficient substitute for Arsenobenzol. May have an inhibitory rather than a curative effect. It is not established that Bismuth is more effective than Mercury in the permanent cure of syphilis.—T. Anwyl-Davies, L. i./27,200; *ibid.* 148-152.

✱**Muthanol** (T.M. 426043).

Dose.—First Treatment. Series of ten injections are given, each series being followed by ten days' rest, this treatment to be continued until specific lesions have disappeared and the Wassermann Reaction is negative.

Protective treatment. When the above two results are obtained, a further treatment of two years duration should be given as follows :–

First and Second Year	A series every 4 months.
Third Year	A series every 6 months.

Muthanol is described as a suspension of radioactivated Bismuth Oxide in sterile oil.

Its simplicity is an advantage over the Tartrate method. Bismuth Oxide contains more Bismuth than the organic compounds. Further, the organic compounds operate, no doubt, in the tissues as Bismuth Oxide, into which they are first changed. The minute quantity of Mesothorium Bromide may act as a catalysator. The addition is viewed as rational, as the last member of the Thorium degradation products is Bismuth. Rapid disappearance of the spirillum from the surface of chancres, cicatrisation of lesions, absence of retrogression and good effect on the Wassermann Reaction are reported.

Muthanol Ampoules 2 Cc. contain 0·15 Gm. Bismuth Oxide.

Muthanol Suppositories containing 0·2 Gm. Bismuth Oxide in each are also made for alternative treatment.

Bismuth Hydroxide suspended in Water and Glycerin stated to be preferable to the oily preparations.—Svend Lomholt. E. T. Burke obtained best results with metallic Bismuth.—Brit. Jl. Vener. Dis., per L. i./25,497.

Quinine Iodo-Bismuthate, Fr. Cx. Nouv. Supp. (1926).
$(BiI_3)_2C_{20}H_{24}N_2O_2{\cdot}2HI=1759{\cdot}68$.

Method of preparation is given. *See also* C.D. ii./25,423.

Suspension D'Iodobismuthate de Quinine, Fr. Cx. Supp. (1926).

Sterilise the pestle and mortar by burning a little spirit in the latter, and incorporate Quinine Iodobismuthate, 17 Gm., with Anhydrous Wool Fat 5 Gm., and Neutral Olive Oil 87 Gm., making up to 100 Cc.

Quinine Iodobismuthate Sterules are prepared containing 1 Cc., *i.e.* 0·17 Gm., corresponding to 0·04 Gm., Bismuth.

Iodo-bismuthate of Quinine gave good results in some cases apparently drug-fast to Arsenic and Mercury.—Col. E. T. Burke, L. i./24,902. Good results confirmed.—Margaret Rorke, *ibid.*

✱**Bi-Quinyl** (T.M. 440714). Is also a double Iodide of Quinine and Bismuth available in commerce.

Dose.—Each ampoule contains 0·3 Gm. of the compound in 3 Cc. of oil. Adult dose, one ampoule every 3 days up to 15 or 20 injections. This constitutes a course of treatment, to be repeated after intervals of 10 days.

The combination of Quinine and Iodine with the Bismuth is thought to enhance the spirillocide action.

BOUGIES.

Urethral Bougies. These are of **gelatin basis** in *two* lengths, namely, $2\frac{1}{2}$ inches and 4 inches, and are directed to be dipped in warm water prior to insertion. For various contents, *see* Index. (U.S. requires 7 Cm.=$2\frac{3}{4}$ inches, weighing about 2 Gm., and 14 Cm. =$5\frac{1}{2}$ inches, weighing about 4 Gm. respectively.) They are also made of **Cacao Butter** of *any* length up to 6 inches if desired, and of six sizes, with the following diameters:—No. 1, $\frac{1}{8}$ inch; No. 2, $\frac{5}{32}$ inch; No. 3, $\frac{3}{16}$ inch; No. 4, $\frac{7}{32}$ inch; No. 5, $\frac{1}{4}$ inch; No. 6, $\frac{5}{16}$ inch. For the treatment of gonorrhœa in its various stages. Those of Cotarnine (*q.v.*) are used to check bleeding.

The **U.S. Urethral Bougies** made with Oil of Theobroma are 7 Cm. and 14 Cm. long and weigh about 1 and 2 Gm. respectively.

Nasal Bougies are termed **Buginaria.** These are of elastic gelatin basis $3\frac{3}{16}$ inches in length and are medicated with **Boric Acid, Carbolic Acid, Copper Sulphate and Zinc Sulphate.** For strengths, *see* Index.

Nasal Bougie Mass.—Gelatin 15, Water 13, Glycerin 18 (weight).

BROMUM.

Br=79·916.

A dark brown liquid, Sp. Gr. 2·99, with penetrating odour. Soluble 1 in 30 of water. Is not used as such medicinally. Since the war Bromine has been made in large quantities in France from sea water.

Antidote to the fumes of—
Alcohol inhalation is good, *see also* Chlorine and Irritant Gases under Antidotes.

Bromine Sterules for urea estimation, **1, 2·2 and 4 Cc.** and *Liquor Bromi, vide Vol. II.*

Calcii Bromidum. U.S. $CaBr_2$=199·902.

Dose.—10 to 20 grains (**0·6 to 1·2 Gm.**).

A white crystalline powder soluble 1 in 0·3 of water and about 1 in 0·6 of alcohol 90%.

Fr. Cx. Nouv. Supp. (1926), allows 20 to 25% of water. This salt is obtained by solidification of the molten mass in its water of crystallization.

Flavoring.—Syl or Glyl Menthæ Piperitæ, Syl Limonis (bol dose), Syrupus Aromaticus.

Has been given in epilepsy with good results. Frequency an intensity of fits is diminished—effective in half the dose of Potassiu Bromide. Mental activity increases and general health improves Effect marked if patient previously on Potassium Bromide.—A Humphrey Davy, B.M.J. ii./15,692. A. G. Auld points out th relative content of Bromine in the two salts. The effect is nevertheless, in his opinion, due to the calcium.—*ibid.* p. 765; see als *ibid.* pp. 876, 909.

Asthma, hay fever, and anaphylactic shock treated with Calcium Bromid intravenously: also infections such as typhus. Prevents post-operativ bleeding in obstructive jaundice. Intravenously more useful than orally i tetany following excision of goitre.—Jl. Intrav. Therap., Jan. '26,5.

Magnesii Bromidum $MgBr_2+6H_2O=292{\cdot}248$.

Contains 54·9% of Bromine, given in *doses* of 10 to 20 grains (**0·6 to 1·2 Gm.**) for hysteria and epilepsy as a nervine sedative. Soluble 1 in 0.6 of water and 1 in 2 of alcohol 90%.

Manganesii Bromidum $MnBr_2+4H_2O=286{\cdot}826$.

Contains 55·7% of Bromine, and is given in *doses* of 1 to 3 grains (**0·06 to 0·2 Gm.**) as a nervine tonic. It is soluble 1 in less than 1 of water and alcohol. Both of these may contain less water of crystallisation.

Bromal Hydras. $CBr_3.COH.H_2O=298.772$.

Dose.—2 to 5 grains (**0·12 to 0·3 Gm.**) at bedtime.

In large colourless crystals, which melt on the hand, soluble in water 1 in 2½. Applied externally it irritates the skin. It has been tried in epilepsy, chorea and insomnia.

✱**Bromalin** (T.M. 230304).—*Syn.* BROMETHYLFORMINE, HEXAMETHYLENTETRAMINBROMETHYLATE, HEXAMINE ETHYL BROMIDE. $(CH_2)_6N_4C_2H_5Br=249.084$.

Dose.—5 to 30 grains (**0·3 to 2 Gm.**) in cachet or mixture.

In crystalline powder or scales, soluble 1 in 0.6 of water, and about 1 in 25 of alcohol 90%. A sedative in neurasthenia and epilepsy.

Brominoleum, Brominol (33%).—*Martindale.*

Dose.—10 to 60 grains (**0·6 to 4·0 Gm.**) approximately equivalent in content of Bromine to 5 to 30 grains Potassium Bromide.

An additive compound of Bromine and Sesame Oil, containing 33⅓% of the halogen in form of a thick brown odourless oil, Sp. Gr. 1·31. Gradually liberates bromine to the system.

Uses.—In epilepsy and all forms of nerve troubles, also in headache and sea-sickness. May also be rubbed into the skin if diluted with an equal weight of Lanolin Ointment.

It may be taken internally shaken up with an equal volume of syrup, in beer, wine or milk, or dispensed as follows : Brominol 33% 2 ounces, Gum Acacia 1 ounce, Chloroform 18 drops, rub together and add quickly with vigorous agitation Water *q.s.* to 6 ounces. *Dose.*—2 drachms equal 20 grains Potassium Bromide.

Brominol containing 10% of Bromine is also prepared.

Sp. Gr. 1·045. A dose of ¼ ounce of this equals approximately 20 grains of Potassium Bromide.

Capsules contain 2 Gm. of 33% Brominol in each equivalent to (**1 Gm.**) 15 grains Potassium Bromide.

Ⓟ **Mistura Brominol cum Nuce Vomica.** Brominol 30 grains, Gum Acacia 30 grains, Tincture of Nux Vomica 6 minims, Spirit of Chloroform 15 minims, Water to ½ an ounce. For one average dose.

The urine from patients under Brominol treatment contains small quantities of Bromine in combination, and the fæces contain traces.—W. H. M.

Brominol Tablets are prepared, each equivalent to 9 grains of Potassium Bromide.

Brom-Albumen. *Syn.* BROMO-PROTEIN.

Dose.—10 grains (**0·6 Gm.**)=¾ grain Bromine approx.—increased as desired.

A preparation containing 7% Bromine in organic combination with albumen, made by interaction of Bromine with Egg Albumen, in form of a light brown powder. Used as a substitute for Alkaline Bromides in epilepsy, where considerably larger doses than the above may be required. It is hardly soluble in 0·2% Hydrochloric Acid, even in presence of pepsin, but is readily dissolved in 0·5% Sodium Bicarbonate in the presence of Pancreatin, hence it is assumed that digestion and absorption takes place in the intestines.

Bromoform, P. Helv., Fr. Cx., Ph. Ital., Ph. Ned. V. $CHBr_3$=252·756.

Dose.—½ to 2 minims (**0·03 to 0·12 Cc.**) or more. P.G.VI. and FR. Cx. maximum single dose 0·5 Gm.; max. during 24 hours 1½ Gm. (=8 minims approx.). Children as many drops as years old—up to 6.

A limpid, colourless, sweet liquid, with an agreeable odour; Sp. Gr. 2·829 to 2·833, B.pt. **148°** C. Soluble in alcohol 90% in all proportions, slightly in water, decomposed by light. It should be preserved by addition of 0·5 to 1% alcohol. Is a powerful sedative, useful in insane cases. **Capsules** contain ½ minim (**0·03 Cc.**) dissolved in oil.

Aqua Bromoformi. Well shaken, 1 minim is dissolved in 2 ounces of water. *Dose.*—1 to 4 ounces (**30 to 120 Cc.**).

For sea-sickness half doses occasionally

Syrupus Bromoformi. *Dose.*—¼ to 1 ounce (**8 to 30 Cc.**)=½ to 2 minims of Bromoform. To be diluted with an equal quantity of water or more, *at time of taking.*

Bromoform 2 minims, Alcohol 90%, 80 minims, Syrup 160 minims, Glycerin ½ ounce.

The Sirop of the Fr. Cx. Nouv. Supp. 26, is Bromoform 1, Alcohol 90% 9, Glycerin 30, Syrup 160.

Uses.—In whooping cough diminishes number, duration, and severity of attacks, and mucous secretion is more easily got rid of.

P1 ✶**Rami** (T.M. 245697) **Syrup.** *Dose.*—Adult, 1 tablespoonful 3 to 5 times a day: Children over 5, 1 teaspoonful 3 to 5 times daily: Children under 5, 15 minims diluted, every hour or ½ hour according to age. *Contains 'per (tablespoon) dose,'* Alcoolature d'Aconit 3 drops, Codeine 0·01 Gm., Bromoform 2 drops, Tolu 0·05 Gm.

Brometone. TRI-BROM-TERTIARY BUTYL ALCOHOL.

$C_4H_7OBr_3$=310·804. *Dose.*—5 grains (**0·3 Gm.**), repeated 2 or 3 times during 24 hours.

White crystals melting at 167° C. containing about 77% bromine. ***Soluble*** in alcohol, slightly in cold water.

Uses.—Hypnotic, analgesic, antiseptic. Useful in sea-sickness. **Capsules of Brometone,** 5 grains in each.

In epilepsy, in some cases, of value and has some hypnotic power.

Large doses may produce dizziness, loss of appetite, and mental heaviness.—H.

Tribromethylalcohol. *Syn.* **E.107** or **Avertin,** CBr_3CH_2OH. A new German anæsthetic, the narcotic action of which is said to be rapid an intravenously almost instantaneous. With excessive doses respiratory centre rapidly paralysed. Decomposes on long exposure to light or in alcoholic solution.—L. i./27,1037.

For narcosis 0·1 Gm. per kilo given by enema 20 minutes before operations. Sleep ensues in a few minutes, if not, give additional dose ¼ of first but total not to exceed 0·15 Gm. per kilo. Patient sleeps 3 or 4 hours and does not vomit. Diseased colon a contraindication. Caused erosion of colon with fatal results in three cases. A few drops of Ether should be given to accelerate narcosis. The drug should be dissolved in mucinous fluid. 8 cases of severe asphyxia recorded and 18 of cardiac disturbance, including 4 deaths. Drawback is that dose cannot be regulated during narcosis, the fate of patient depending on amount originally given.—per L. i./27,1267.

For a résumé on Organic Bromine Compounds with comparison of the quantity of Bromine in daily doses *vide Vol. II.*

BUTYL-CHLORAL HYDRAS. (*B.P.* '14.)

Syn. CROTON-CHLORAL HYDRATE (formerly so-called), TRICHLORBUTYLIDENE GLYCOL. $CH_3.CHCl.CCl_2,CH\,(OH)_2=193{\cdot}427$.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**), in pills or cachets.

Antidotes.—Stomach tube, emetic, coffee, caffeine, atropine.

This body is produced by the addition of water to liquid Butyl Chloral which is the final product of the action of Chlorine on Aldehyde. In pearly-white crystalline scales with pungent odour resembling that of Chloral Hydrate, and an acrid, nauseous taste. ***Soluble*** 1 in 43 of cold water; freely in alcohol, 1 in 1 of glycerin, and olive oil 1 in 20.

Incompatible with alcohol. Butyl-Chloral Alcoholate will be formed, and in case of some mixtures will be precipitated.

Menthol 2, with Butyl Chloral Hydrate 1 part, liquefy. Combines also with Phenazone, *q.v.*

Flavoring.—Syl Menthæ Piperitæ; Extractum Glycyrrhizæ Liquidum, Syrupus Zingiberis.

Uses.—In combination with phenazone, cannabis, or gelsemium, Butyl-Chloral is useful in migraine; neuralgia of nerves other than the cranial are rarely benefited.

Mistura Butyl-Chloral.

Butyl-Chloral Hydrate 4 grains, Glycerin 15 minims, Water to 1 ounce.

Pilula Butyl-Chloral. 3 grains (**0·2 Gm.**) or more.

Dose.—1 every 2 hours, or hourly.

Ⓟ **Pilula Butyl-Chloral cum Gelseminina.**—NEURALGIC PILLS.

Gelseminine Hydrochloride $\frac{1}{200}$ grain (**0·0003 Gm.**) is added to each of the above. Ⓟ **Tablets** are also prepared.

For facial neuralgia two at the outset followed by one hourly until six have been taken.

Ⓟ **Pilula Butyl-Chloral cum Camphora et Gelsemio.**

Butyl Chloral Hydrate 2 grains, Camphor 1 grain, Alcoholic Extract of Gelsemium ¼ grain, Powdered Acacia Gum ¼ grain, Powdered Tragacanth ¼ grain, Powdered Liquorice Root 1 grain, Syrup *q s.* Varnish. Use similar to the last mentioned.

Chlorbutol. *Syn.* **Chloretone; Trichlor-Tertiary-Butyl-Alcohol** $CCl_3.(CH_3)_2C.OH=177{\cdot}427$.

Dose.—5 to 24 grains (**0·3 to 1·5 Gm.**) in cachet, capsule, or tablet followed by a draught of water or milk, or suspended in a mixture.

Manufacture.—This compound was discovered by Willgerodt in 1886, see Ber. 19 (1886), 2455. It is prepared by adding Potash to a mixture of Chloroform and Acetone, and fractionally distilling.

White crystals, with camphoraceous taste, melting at 80° C. It volatilises with heat. ***Soluble*** 1 in 200 of water (solutions should be made as required), 1 in 10 of glycerin, 3 in 2 of alcohol 90%, 1 in 50 of Liquid Paraffin, 1 in 12 of Olive Oil.

Uses.—Local anæsthetic and antiseptic and slightly hypnotic. Acts particularly on the stomach. *Solutions* in liquid paraffin 1 to 2% have been used for inflammation of the middle ear.

Vaginal pruritus has been treated with a warm douche 0·4%.

For piles, 5 grains in a 30 grain suppository; for a dusting powder for wounds and scalds use Chloretone 23, with Zinc Oxide 120, and French Chalk 90 parts. 10% may be added to Linimentum Calcis for burns.

Chloretone Inhalant.—Contains Chloretone 1%, Camphor, Menthol and Oil of Cinnamon in Liquid Paraffin for use in rhinitis, bronchitis, nasal catarrh and 'sore throats.'

Capsules, 5 grains, check sea-sickness and other vomiting and are useful in chorea.

POST-OPERATIVE VOMITING and shock prevented. Value proved by 15 grains in a cachet where time permitted, to every adult operated on 1½ hours beforehand. Spinal Injection of Cocaine in Chloretone Saturated Solution has to our knowledge (Bickle, Adelaide) been conducted without vomiting occurring.

TETANUS successfully treated by Chloretone in dose varying between 30 and 120 grains per rectum in Olive Oil, and Antitetanic Serum. The Chloretone injections reduced rigidity of the jaw.—B.M.J. ii./10,1402.

SEA-SICKNESS. Should be given either in solution or limited to 10 grains daily with intermissions when extended over several days. Satisfactory when given in Oil or Paraffin or in Cachet when taken with moderation.—L. i./13,1375.

Semi-coma in a woman who took 30 grains for toothache has been observed. Undoubtedly a useful drug in the treatment of many conditions, but its action requires careful and constant supervision. The explanation of toxic effect is, that there is accumulation of the insoluble drug in the alimentary canal followed by sudden absorption of large quantities when any substance capable of absorbing it is taken by the mouth.—L. i./13,1557.

DYSMENORRHŒA well treated with Chloretone 5 grains two or three times daily for week before period.—B.M.J.E., i./26,13.

CAFFEINA.

Caffeine (*B.P.* '14). P.G. VI., PH. NED. V., FR. CX., P. Jap., P. Ital. *Syn.* THEINE, GUARANINE. $C_8H_{10}N_4O_2,H_2O=212{\cdot}128$.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**) or more—as much as 18 grains being recommended—given in solution, or in pills.

A crystalline alkaloid (M. pt. about 235 to 237° C.), usually obtained from the dried leaves of *Camellia Thea*, or dried coffee-seeds—*Coffea arabica*; also contained in Guarana (*q.v.*) and in Maté—the leaves of *Ilex paraguayensis*—also kola nuts—the seeds of *Cola acuminata*, growing in Western Africa; it is identical with Theine and Guaranine. Caffeine and Theobromine (*q.v.*) can be prepared from Xanthine$\left\{\begin{matrix}\mathrm{NH.CH{:}C.NH}\\ \mathrm{CO.NH.C{:}N}\end{matrix}\right\}\mathrm{CO}$ (Theobromine being di- and Caffeine tri-methyl-xanthine). These are Purin derivatives (*q.v. Vol. II.*). ***Soluble,*** 1 in 80 of water, about 1 in 40 in alcohol, less in ether; acids render it more soluble in water, but it is a feeble base, and on concentrating the solution of the salts they are apt to split up, and the caffeine crystallises out by itself. Is rendered soluble in less water by the addition of an equal quantity of Phenazone. See also Caffeine-Sodio-Salicylate, *etc.*

Regarding the caffeine in coffee and tea taken as a beverage see Vol. II.

Antidotes.—Stomach-pump and emetics, *e.g.* Apomorphine $\frac{1}{12}$ grain. Nitroglycerin is also of value. Poisoning by 60 grains of citrate caused burning in throat, giddiness, violent vomiting, purging and diuresis, tremors of extremities, pain in stomach and bowels, and great thirst.

Uses.—In heart affections (*e.g.*, cardiac failure in pneumonia) but its power as a cardiac stimulant is doubted, nervous headache, dropsy (of value in renal dropsy), stomachic (lessens metabolism). It wards off fatigue. Also given in diarrhœa. Subcutaneously in rheumatic affections with Sodium Salicylate *q.v.* Locally, to the eye, it dilates the pupil.

Bronchial asthma of adults is relieved by 2 to 5 grain doses of the Citrate before bedtime and again during the night.—Yeo.

Neuralgic Powders. Caffeine 1 grain, Quinine Hydrochloride 5 grains, Phenazone 10 grains (or Phenacetin 5 grains).

CHLOROSIS.—Caffeine in conjunction with Digitalis should be used. Magnesium Sulphate is useful for the bowels, and Zinc Sulphate has been tried by emesis. Intake of liquids must be limited, and as little salt must be taken as possible.—B.M.J. ii./09.1668.

For Estimation of Caffeine in presence of Acetanilide see Vol. II.

Elixir Caffeinæ—*Martindale.*

Dose.—1 to 2 drachms (=1 to 2 grains of Caffeine). Caffeine 17·5, Diluted Hydrobromic Acid 4, Simple Elixir (B.P.C. 1894) to 1,000.

Ⓟ **Elixir Antineuralgicum.** (*Not* within D.D.A.)

Dose.—1 to 2 drachms (4 to 8 Cc.).

Phenazone 50, Caffeine 30, Cocaine Hydrochloride 1, Cochineal Tincture 6, Elixir of Orange 25, Alcohol (75%) to 1,100. Has been used on the Continent for headache.—Ph. Notes.

Caffeinæ Citras. $C_8H_{10}N_4O_2.C_3H_4(OH)(COOH)_3 = 376{\cdot}176$.

CAFFEINA CITRATA (*B.P.* '14), U.S. (No formula; 48—52% Anhydrous Caffeine.)

Dose.—2 to 10 grains (0·12 to 0·6 Gm.).

Treat Caffeine 1 and Citric Acid 1 in a small quantity of distilled water, and evaporate to dryness on a water bath.

Soluble—1 in 32 water, 1 in 25 alcohol (90%).

Incompatible with Potassium Iodide and Spiritus Ætheris Nitrosi, Iodine being liberated. But the following according to our experiments does not darken:—Potassium Iodide 5 grains, Caffeine base 2½ grains, Spiritus Ætheris Nitrosi (neutralised with Ammonium Carbonate) 30 minims, Water to 1 ounce.

Also incompatible with Sodium Salicylate. A little Sal Volatile or Sodium Hydroxide will prevent the Salicylic Acid being thrown out —or use half the Citrate as Caffeine Base.

Flavoring—Glyl or Syl Vanillæ, Glyl or Syl Lavandulæ; Syrupus Aurantii Floris.

Uses.—See Caffeine.

Caffeinæ Citras Effervescens. (*B.P.*'14). Contains 4% of the Citrate, or about 2½ grains in a drachm, as in B.P. '98.

Dose.—1 to 2 drachms.

Effervescent Caffeine Citrate with Potassium Bromide, has in addition 5 grains of the latter salt to the drachm. For headache.

Tabellæ Caffeinæ Citratis, containing 1 grain in chocolate basis, are agreeable to the taste. **Tablets,** contain 2 grains (0·12 Gm.).

Tablets of Caffeine 1 grain (0·06 Gm.), with **Phenazone** 3 grains also prepared with **Phenacetin** 4 grains. *Dose.*—1 to 5.

Caffeine Hydrobromide, $C_8H_{10}N_4O_2$, HBr, $2H_2O = 311{\cdot}068$.

Soluble 1 in 50 approx. **Hydrochloride** $C_8H_{10}N_4O_2$, HCl $2H_2O = 266{\cdot}617$ and **Hydriodide** (unstable).

Dose of each.—½ to 5 grains (0·03 to 0·3 Gm.) or more. In transparent crystals.

Tablets contain 2 grains each of the Hydrobromide.

Effervescent Caffeine Hydrobromide is prepared containing 4%, or about 2½ grains in a drachm.

Dose.—1 to 2 drachms (4 to 8 Gm.).

Caffeinæ Salicylas. $C_8H_{10}N_4O_2.C_6H_4OH.COOH = 332{\cdot}160$.

Dose.—1 to 5 grains (0·06 to 0·3 Gm.).

White crystalline powder soluble in water.

Caffeine is very soluble in aqueous solutions of benzoate, cinnamate, and salicylate of sodium. These dissolve it in chemically equivalent quantities.

Caffeinæ Sodio-Salicylas.

Dose.—1 to 4 grains (0·06 to 0·25 Gm.) hypodermically, or *per os.* Max. single dose *per os*, 1 Gm. or in 24 hours, 3 Gm.

Evaporate to dryness Caffeine 50, Sodium Salicylate 60, Water 200. A white amorphous powder, containing 43.8% of Caffeine, and soluble 1 in 2 of water.

This salt and the corresponding cinnamate and benzoate act like Digitalis, but more rapidly.

Caffeinæ Sodio-Benzoas. P. Jap. IV., P.G. VI., U.S. X.

Dose.—As for the Sodio-Salicylate. Contains approx. 40% Caffeine. Ph. Ned. V. requires 50%.

Soluble 1 in 2 of water. 1 in 40 of Alcohol 90%.

As stimulant for desperately ill patients 2 grain doses, *intravenously.* It improves breathing, circulation and other fundamental functions, and, following its use, the mind and depressed vital reflexes become active and normal. Coma, shock, collapse under anæsthesia, and poisoning from morphine and other depressant drugs treated. —W. W. Duke, J.A.M.A., April 7th, 1923,998; see also P.J. i./23,403.

Sterules, Intravenous, of Caffeine Sodio-Benzoate.

2 grains (**0·12 Gm.**) in 15 minims (**1 Cc.**) and in 75 minims (**5 Cc.**) are prepared.

HÆMOGLOBINURIC FEVER well treated with Caffeine Sodio-benzoate intramuscularly, 3 grains twice daily for 7 days and once daily for further 5 days.—A. A. Facio and M. D. Rojas, Jl. Trop. Med., Feb. 16, '25,88.

SHOCK.—For use in the event of severe Novocain reaction. Caffeine 3 grains Sodium Benzoate 7 grains, Strychnine $\frac{1}{40}$ grain.—C. Hope Carlton, B.M.J. i./25,651.

Injectio Caffeinæ Hypodermica. K. C. H.

Caffeine 20 grains, Sodium Salicylate 17½ grains, Distilled Water to 1 drachm. *Dose.*—1 to 6 minims, contains 1 grain in 3 minims.

Unirritating—recommended for alcoholic and morphine intoxication, also for hemicrania and in rheumatism.

The addition of camphor as preservative for this injection is suggested. Thus to 3 Cc. of pure sterile glycerin add a solution of caffeine and sodium salicylate of each 0·25 Gm. in water 1 Cc.; then add spirit of camphor (10%) 1 Cc.; 5 Cc. contain caffeine 0·25 Gm. and camphor 0·1 Gm.

Hypodermic Tablets contain Caffeine Sodio-Salicylate ½ grain (**0·03 Gm.**). **Sterules** Hypodermic 1 grain (**0·06 Gm.**) and 2 grains (**0·12 Gm.**)

Iritis of rheumatic origin has been treated by injection into the median cephalic vein of Caffeine 0·05 Gm. with Sodium Salicylate 0·5 Gm.

Caffeinæ Tri-iodidum, Caffeine Di-iodo-hydriodide.

(*Sometimes called Caffeine Periodide—but it is not a 'true' periodide as we view it.*) $C_8H_{10}N_4O_2HI, I_2+1\frac{1}{2}H_2O=602{\cdot}938$.

Dose.—2 to 4 grains (**0·12 to 0·25 Gm.**).

In prismatic black iridescent crystals, rich in iodine.

Has been used with success in rheumatism and gout.

Assay.—The two loosely combined Iodine atoms can be estimated by titration with standard thiosulphate solution and should equal about 43%. The total iodine is 63% approx.

P1 Pilula Caffeinæ Tri-Iodidi Composita (*Billimoria*).

Dose.—One early in the morning, one about 3 or 4 p.m., and one at bedtime with water, to be lessened to two or one a day as required.

Caffeine Tri-iodide 2 grains, Arsamin ¼ to 1/3 grain, Valerianic Acid 2 minims, Green Extract of Belladonna 1/6 to 1/3 grain, Jalap Extract, *q.s.* (if constipated), Reduced Iron 1 grain (in asthma only). For one pill or preferably Gelatin Capsule.

Asthma in India has been well treated with this compound.

R. B. Billimoria (Bombay) states the majority of the cases there have not the usual book type 'attacks,' but dyspnœa every night for days and days, while during the day the patient may be fairly comfortable or again the dyspnœa may be slight or worse.

Whooping cough even in infants, with proportionately smaller doses, has likewise been well treated by this preparation.

Eupnine. *Dose.*—1 drachm before meals up to 4 drachms daily. Contains caffeine and iodine. In asthma, emphysema, and arteriosclerosis.

In asthma it is useful, also Morphine ¼ grain, especially if it induces sickness.—J. Pirie, B.M.J. ii./25,1039.

Caffeinæ Valerianas. $C_8H_{10}N_4O_2.C_5H_{10}O_2=296·192$.

Dose.—½ to 3 grains (**0·03 to 0·2 Gm.**). In irregular crystals or powder, of somewhat variable constitution. It controls hysterical symptoms, and is useful in pertussis.

Ⓟ **Caffeine-Chloral.**

Small white granular crystals, freely soluble in water, with the taste of chloral. Is analgesic and laxative, and in hypodermic injections of 3 to 8 grains useful in constipation, painful gastric distension, sciatica, and rheumatism.

Iodo-Caffeine.—*Syn.* SODIUM-CAFFEINE IODIDE.

Dose.—2 to 10 grains (**0·12 to 0·6 Gm.**)

A white powder, slightly soluble in cold, freely in water at 100° F. Contains 65% of caffeine. Is a good diuretic, especially to prolong the diastole in cases of enfeebled heart. Is useful in cardiac dropsy, and pleurisy with effusion. Said not to disorder digestion.

Antipyrin Caffeino-citricum.—*Syn.* ✱MIGRAININE (T.M. 73257), **P. Austr., P. Jap. IV., P. Helv., and Ph. Ned. V.**

Dose.—8 to 15 grains (**0·5 to 1 Gm.**). Slipule No. 00 holds 8 grains.

Contains 9% of Caffeine, 1% Citric Acid, and 90% of Phenazone, is of crystalline appearance, easily soluble in water.

Incompatibles as Phenazone *q.v.* Is serviceable in headache, but apt to cause sleeplessness.

Migralgin.—*Martindale.* *Dose.*—8 to 15 grains (**0·5 to 1 Gm.**)

Phenazone 88, Caffeine 9, Salicylic Acid 3: the ingredients are fused together. **Tablets** 8 and 15 grains each. Slipule No. 00 holds 8 grains.

Has been used with success by sufferers from headache.

Oxyquinotheine Cachets—Dr. Faivre's.

According to analysis by C. Mannich and L. Schewedes in a German Journa these are said each to contain Caffeine 0·3 Gm., Pyramidon 0·15 Gm., Quinine Sulphate 0·135 Gm., Magnesia 0·04 Gm.—Copied from P.J. i./13,891.

Kola.

Dose.—10 to 20 grains (**0·6 to 1·2 Gm.**). Seeds of *Cola vera* contain about 2½% Caffeine, also in *C. acuminata* (not so much) (*Sterculiaceæ*).

FR. CX. Supp. 1920 allows seeds of other varieties of Cola providing they contain at least 1·25% caffeine. (Not mentioned in FR. CX. Nouv. Supp. 1926.)

Extractum Kolæ Liquidum. B.P.C. *Dose.*—10 to 20 minims. Kola nuts in 40 powder exhausted with 60% alcohol; 1=1.

FR. CX. standardises to 1·25% Caffeine, but the method of manufacture is stated to be impracticable.

The administration of Kola, Coca and Arsenic flavoured with a little Elixir of Orange forms a useful tonic and pick-me-up.

Flavoring.—Syl Lavandulæ; Syrupus Aurantii.

Tinctura Kolæ.

Dose.—20 to 60 minims (**1·2 to 4 Cc.**).

Kola nuts in powder 1, macerate one week in 60% alcohol *q.s.* to 6

Vinum Kolæ.

Kola in coarse powder 1, in Sherry 25, macerate for 7 days, filter and flavour with Essence of Vanilla.

Celerina is said to contain Kola, Coca, Celery, and Viburnum.

Ⓟ **Syrupus Kolæ Compositus.**

Dose.—1 to 2 drachms (**4 to 8 Cc.**) twice daily.

Iron, Quinine and Strychnine Citrate 3, Citric Acid 0·3, Sodium Glycerophosphate 5, Liquid Extract of Kola 50, Alcohol 90% 5, Syrup of Orange to 100. Finished product to be slightly acid. In anorexia, and as a general 'tonic.'—Ph. Notes.

Maté, *Ilex paraguayensis* (*Ilicaceæ*) *Syn.* Yerba, Paraguay tea, Hervea, or Jesuit tea, contains less caffeine than tea, and is less astringent. Removes fatigue and induces sleep.

About the '*herva matte*' drinking, there is a complete system of etiquette. Narcotic in influence, it has none of the after effects of tea. It is tonic, laxative, febrifuge, and stimulant to the digestive organs.—P.J. ii./22,387.

For further notes on Maté—Analytical, Dietetic and Commercial, see Vol. II.

CALCIUM.

Ca=40·07.

Calcii Carbonas. (*B.P.* '14.) $CaCO_3$=100·07. *Syn.* CRAIE PREPARÉE, GEFÄLLTES CALCIUM CARBONAT.

Dose.—Per os 15 to 60 grains (**1 to 4 Gm.**).

White insoluble powder. Much employed in diarrhœa and dysentery and as an ingredient in tooth powders.

Sys Specific. An Indian cure for sprue, dysentery, and diarrhœa. It consists of 'powders' containing principally Calcium Carbonate —one to be mixed with 12 ounces of water and laudanum to be added, if necessary.

Checks fermentation and effect is undoubted.—Sir J. Cantlie, Jl. Trop. Med., Aug. 1/23,255.

Calcium Carbonate with equal parts Calcium Phosphate, a teaspoonful three times daily, highly spoken of for diarrhœa of gastric origin.—D.m.W., Oct. 31, '25,362; per Pres., Jan. '26,14.

Mistura Cretæ, Chalk Mixture (*B.P.* '14).

Dose.—½ to 1 ounce (**15 to 30 Cc.**).

Contains 3% with Sugar 6% and a little Tragacanth, in Cinnamon Water. The powders are generally kept mixed in a dry condition, and added to the cinnamon water as required.

Blair's Tooth Powder. Dissolve 3 of soap in about 4 of water and mix intimately with about 25 of precipitated chalk and dry at moderate heat. Dissolve Catechu 1 in Alcohol 5 and mix intimately with precipitated chalk 25. Mix equal parts of Oil of Wintergreen and Oil of Sassafras with a further 25 of precipitated chalk, using 6 drops of mixed oils for each 100 Gm. of powder. Mix the three portions and sift.—P.J. i./22,263.

Calcii Chloridum. (*B.P.* '14). $CaCl_2$=110·984. (P. Jap. IV. 6 H_2O.)

Dose.—Per os 5 to 15 grains (**0·3 to 1 Gm.**) in aqueous solution, or pills made with syrup; these must be kept in bottles.

Intramuscularly (deeply) 1 grain (**0·06 Gm.**) in 15 minims (**1 Cc.**) or 75 minims (**5 Cc.**). *Intravenously* 4 grains (**0·25 Gm.**) in 75 minims (**5 Cc.**) have been given. Hypodermically it may produce sloughing.

In fused white agglutinated, very deliquescent masses.

Soluble (the fused salt) in water 1 in $1\frac{1}{2}$, in alcohol 90% 1 in 3.

Incompatible with carbonates, phosphates, sulphates and tartrates.

Flavoring.—Prescribe as Elixir *q.v.* or with Elixir Saccharini.

Uses.—Calcium chloride increases the coagulability of the blood, and so acts as a hæmostatic (Sir A. E. Wright). Coagulability of the blood is—

Increased by—
Carbonic Acid,
Calcium Chloride or Lactate
Milk,
Magnesium Carbonate or Lactate.—L. i./08,96.
Phosphoric Acid and Soluble Phosphates,
Strontium Carbonate or Lactate,
Thymus Glands.—L. i /06,645,739. See also B.M.J., ii/10,1594.

Diminished by—
Oxygen,
Alcohol,
Restriction of Food,
Diminution of Lime Salts,
Large quantities of Fluid,
Citric Acid,
Rhubarb,
Acid Fruit Juices,
Acid Wines,
Tobacco Smoking,
Bile,
Leech Extract, Hirudin (*q.v.*).

It is employed in itching skin affections, *e.g.* pruritus, prurigo, urticaria. It is useful in chilblains, full dose frequently, and certain forms of headache, *v. infra.* In tubercular disease, chorea, glandular affections, to stop the growth of uterine fibroids, and to check the vomiting due to sarcinæ.

MENSTRUATION, PROFUSE, to check. Doses of 10 to 15 grains daily for a week before the period, have been given; but not if there be kidney disease.

BLEEDING PILES have been treated by injection every morning of 4 to 6 drachms of a 10% solution.

For INTER-DENTAL FISSURE 15% solution on pledget of wool.

ACUTE LOBAR PNEUMONIA has been treated with 5 to 15 grain dose every 4 hours. Hæmophilia is well treated by this and the lactate.

INTESTINAL HÆMORRHAGES, to check, 30 to 60 grains daily have been given internally, accompanied by rectal injections containing 60 grains to two pints of water; opium may be given in addition.

EPISTAXIS has been treated by 10 grains, *t.d.*

HEART FAILURE accompanying post-influenzal pneumonia, Sir Lauder Brunton pointed out, may be averted by extended use of Calcium Chloride. Usual dosage is 5 to 10 grains every four hours. Increases secretion and tones up the vessels. May be prescribed as ELIXIR *q.v.*

JAUNDICE. 5 Cc. of 10% solution intravenously helped to hasten coagulation of the blood, prevent post-operative bleeding, and neutralise toxic bile products.—Jl. A.M.A. ii./25,885.

For methods of Estimating Calcium Salts in blood, urine and other fluids, see Vol. II.

Calcium has a sedative effect on the nervous system and diminishes permeability of the walls of the blood vessels.—B.M.J. ii./10,1594.

Coagulation of the blood is thought to be little affected by Calcium Chloride *per os*, but injected under the skin the time of coagulation was reduced in 15 minutes from $3\frac{1}{2}$ minutes before injection to $1\frac{3}{4}$ minutes after.—Dixon, B.M.J. ii./09,540.

As ***hæmostatic.*** Calcium Chloride should be given ***intramuscularly.*** Hypodermically it may produce sloughing even in 1 grain doses.—W. R. Grove, B.M.J. i./20,47.

Hæmorrhage controlled by intramuscular injection of Calcium Chloride. 1 grain in 100 minims injected *deeply* into the gluteal muscles is generally painless. The Calcium value of the blood is found to rise slowly to a maximum in 6 hours and then to remain constant for 24 hours. The effect is probably a direct one on the blood vessels. The increased Calcium content of the plasma may cause combination between the Calcium and the blood lipoids with consequent acceleration of clotting. A second injection at end of 24 hours and a third, 24 hours later, may be given. *Per os, Calcium salts have no effect on blood Calcium.* Helpful in uterine hæmorrhages and results in aneurisms hopeful.—W. R. Grove and H. W. C. Vines, B.M.J. ii./21,40.

Hæmophilia treated intravenously, 10—12 injections of 20 Cc. of 5% solution.—Paris Med., Dec. 6, '24,467, per Pres., Jan. '26,23.

Calcium in the human economy.—W. R. Grove, Clin. Jl. Oct.31/23,521.

Tuberculosis (Intestinal—producing tuberculous diarrhœa) has been treated by Calcium Chloride ***intravenously,*** *e.g.*, 5 Cc. doses of 5% solution, with benefit. Ascribed to the action on the sympathetic system, checking peristalsis.—Pres. Nov. '19, p. 202. *The tolerance of the patient should invariably be ascertained before administering the full dose.*

Tuberculous intestinal ulcers healed by weekly intravenous injections of 5 Cc. of 5% solution for 102 weeks.—Am. Rev. Tub., Sept., '25, per Jl. A.M.A., ii/25,1583. It has been adopted with heliotherapy and dietetic treatment as a standard treatment for cases showing gastro-intestinal involvement.—Am. Rev. Tub., April, '24.

Intravenously 'surpassed all expectations' in the treatment of 200 cases of pulmonary, surgical, or inflammatory tuberculosis. 1, 1·2, 1·4, or 1·5% solution injected in two series of 15 injections with 10-day interval between series. Controls hæmoptysis and reduces clotting time of blood.—per Jl. A.M.A., ii./25,1169.

Calcium chloride intravenously is excreted in the urine to the extent of about 50% in 3 hours and is completely excreted in the urine and fæces in 3 days. It is impossible to bring about retention of Calcium in tuberculous patients even by a series of injections at short intervals.—Biochem. Z., '26/146, per B.C.A., '26,A753.

Intravenous injections should not exceed 1% strength. 50 Cc. doses given slowly.—Jl. Trop. Med., Nov. 2, '25,386.

Vomiting of Pregnancy, uncontrollable, successfully treated by intravenous injection of concentrated solution, 35% of Calcium Chloride, in 2 Cc. doses.—L. i./24,663.

Administration and Removal of Lime Salts.

According to Sir James Barr fixed *lime* (in the albumin molecule) increases viscosity and coagulability, while the *free* Calcium ions in association with the suprarenal and pituitary secretions increase the tone and contraction of the arteries and arterioles, heighten blood pressure and maintain force and efficiency of the cardiac contractions. Some persons absorb lime more quickly than others—a glass of milk may increase lime in the urine in an hour or two. The blood is the agent for carrying the lime to the tissues and from them to the excretory organs. Lime Salts have been found useful in treating exophthalmic goitre. The following are some special lines of treatment.

Angina Pectoris.—Phosphoric Acid ½ drachm (of the dilute acid) every four hours and all lime to be excluded from diet and the drinking water. On the other hand, there may be deficiency of lime, in which case Calcium Iodide and Iodine Tincture is beneficial.

Arteriosclerosis.—Chronic high tension leads to degenerative changes with subsequent atheroma and calcification of the deep layers of the intima of the aorta—lime salts are deposited as Calcium Soaps. Women are not so liable to arteriosclerosis as men—they get rid of a good deal of Calcium with each menstrual period.

Asthma.—There is an excess of free Calcium ions in the blood. Decalcifying agents to be given and lime-free diet. Milk, etc., rigidly excluded.

Bronchitis and Emphysema.—There is not, as a rule, too much free lime, but in the later stages too much fixed lime—rigid costal cartilages and fixed chest wall. Never let these become rigid—use decalcifying agents and lessen intake of lime.

Cirrhosis.—Lime index generally low, owing to the catarrh of the stomach and the intestines set up by the alcohol. First stop the alcohol.

COLITIS.—In some cases of obstinate constipation there is too much lime in the blood and intestinal wall. In mucous colitis all forms of lime should be forbidden. Fats of the unsaturated type, *cf.* note under Oleum Morrhuæ, *e.g.*, a wineglassful of Olive Oil at bed time should be ordered.

DIGESTIVE TRACT.—So-called 'congenital' hypertrophic stenosis may be due to excess of lime in the milk. If people kept their bowels open, thus preventing *B. Coli* from assuming a malignant type, appendicitis would be rare. Some people absorb Calcium badly—this is due to the form in which it reaches the mucous membrane. The insoluble fats, Stearin and Palmitin, which constitute the greater part of beef and mutton fat, can be extracted from the fæces to the extent of 80% or more. The acids of these fats when split off readily combine with Calcium forming insoluble soaps which irritate the mucous membrane. Cod Liver and Olive Oil, butter and bacon fat contain a large amount of unsaturated fatty acids, which, *even* with lime, form relatively soluble soaps. When, therefore, a person is for any reason on a + lime diet the fat should consist largely of Olein. This may partly account for beneficial action of Cod Liver Oil in rickets.

The popular view that ***milk*** is a suitable diet ***in adults*** in any form of ***illness*** is ***erroneous.*** In the production of intestinal stasis the lime salts play an important part. Insoluble Calcium Soaps have an injurious, irritating effect on the intestinal mucosa. On the other hand in atony of the stomach and intestines there is deficiency. Where lime is necessary it may be given internally as Iodide or Glycerophosphate or subcutaneously largely diluted with Normal Saline with addition of 5% Glucose.—B.M.J. ii./12,695.

The commonest cause of gastric catarrh and of cirrhosis of the liver is alcohol; while the teetotaller, from eating too much and from immoderate consumption of lime salts, more frequently suffers from arteriosclerosis and chronic diseases of the kidneys.—B.M.J. ii./12,162.

DISSEMINATED SCLEROSIS.—Calcium Salts useful: the Sodium Salts injurious. Acids should be avoided.

EPILEPSY.—All the soluble Calcium Salts do good. Calcium Iodide is the most efficient. Milk foods good. *See also* Calcium Lactate.

LOCOMOTOR ATAXIA.—The Calcium Salts are in excess. Give Acid and Strychnine.

MIGRAINE.—Lime Salts as a rule are in excess. Eliminate same from the diet and give Magnesium Sulphate in the mornings.

MUSCULAR SYSTEM.—In myalgia, or the so-called muscular rheumatism, there is Calcium deficiency. Correct also any dilatation or acid fermentation.

NEURASTHENIA AND HYSTERIA.—Lime Salts variable. As a rule they are deficient—give Calcium Glycerophosphate.

PNEUMONIA.—'In the acute stage of pneumonia the more scanty and the more sticky the expectoration, the more viscous the blood, the more Lime Salts and leucocytes it contains, *caeteris paribus*, the more favourable the prognosis, and on the other hand the more fluid and hæmorrhagic the expectoration, the more liquid the blood, and the less the Lime Salts and leucocytes, the worse the prognosis.'

RHEUMATISM, ACUTE.—There is an excess of free Calcium ions and a tendency to fibrin formation. Milk diet does harm—plenty of red meat which increases the Ammonia in the tissues and thus neutralises the sarcolactic acid, is beneficial. In gout there is more frequently an excess of lime in the tissues and urine than in the free state in the blood—decalcify, *e.g.*, with Phosphoric Acid.

SKIN—ECZEMA, ETC.—In many cases there may be deficiency of lime and a dilated stomach. In urticaria, eczema and serum rashes there is deficiency of lime in the blood.

TETANY AND CRAMP.—Usually there is dilatation, acid fermentation and deficiency of Calcium Salts.

URINARY TRACT.—Healthy kidneys always excrete a certain proportion of Calcium, though not so much as the bowel. When diseased, Calcium may be retained. It is useful to precipitate the lime when examining urine as a routine. If there be no excess in the blood there will be none in the urine, but the condition of the kidneys and the Sp. Gr. of the urine must be taken into account. In dropsy, Sodium Chloride should be excluded while lime salts are beneficial.

In Dupuytren's contraction surgeons' operations have all failed. There is an excess of Calcium in these cases.—Sir James Barr, B.M.J. ii./10,829.

In severe HÆMATEMESIS OF GASTRIC ULCER the only reliable drug is Calcium Chloride, 1 drachm dissolved in 5 or 6 ounces of water given by the rectum, alone or in conjunction with saline transfusion or subcutaneous injections.—Whitla, Pract. Med.

General References to 'Lime' Therapy.

SPASMOPHILIA (TETANY OF INFANTS) is said to be aggravated by addition of Calcium to the milk. Cows' milk contains five times as much Calcium Chloride as human. Tetany is viewed as a form of Calcium poisoning.

In the **Nauheim Baths** the increased specific gravity has a primary effect of raising the peripheral resistance of the body which is afterwards followed by reaction, and the effervescence stimulates, but the Calcium Chloride in the water has no effect—it is not absorbed—otherwise it might work great mischief.

THROMBOSIS OR EMBOLISM, tendency to, should be stopped by decalcifying agents such as Phosphoric and Citric Acids and their soluble salts.—Sir James Barr.

ANEURISM OF THE AORTA (abdominal) apparently cured by Calcium Chloride in doses of 15—30 grains.—Whitla, Pract. Med.

The popular belief that hot lemonade 'cuts the phlegm' in bronchitis may be due to the fact that citric acid in lowering the coagulability of the blood would thus give it greater ease of gaining access to the infected focus.

Decalcified dietary in arterial atheroma.—The amount of 'lime' necessary to man decreases with age. An adult should not take more than 1 Gm. a day—he eliminates about 0·9 Gm. *pro die*—elimination ought to be proportional to intake. Cows' milk, cheese, eggs, onions, contain 0·2%, being rich in lime. Moderately rich (0·1 to 0·2%) are peas, beans, cauliflower; poor in lime (less than 0·1%) are bread, meat, fish (most kinds), potatoes, apples, pears, plums, etc. Large amounts of milk, bread, beef tea, and green vegetables must not be taken by atheromatous subjects.

ANGIO-NEUROTIC ŒDEMA treated with 10 grain doses thrice daily, increasing to 20 grains. The swellings which appeared continuously in different parts of the body disappeared completely.

An excess of Calcium Salts in the blood thought to be associated with the menstrual period.—P.R.S.M., Obst. Sect., *Vol. I.*, 291.

Clinically the effect in SKIN DISORDERS though good is not due to increased coagulability of the blood. The soluble salts have no particular value. Mistura Cretæ as useful as Calcium Lactate.—Prof. R. B. Wild.

A seasonal variation, especially in children, of Phosphorus and Calcium content of the blood—percentage being highest from March to July, the months of maximum sunshine, with a fall from August to February. —C. W. Saleeby, P.J. i./23,247.

In GLYCOSURIA the greater the amount of sugar the larger the excretion of Calcium. It can be reduced by giving Sodium Bicarbonate.—F. Ransom.

ECLAMPSIA treated by washing out the stomach and transfusion of a pint of Calcium Chloride Solution (30 grains to the pint) into a vein of the arm—also 20 grain doses four times daily *per os*. Rapid improvement. Possibly the Calcium Chloride acts as sedative to nerve cells.—B.M.J. ii./12,1124.

HAY FEVER. Consumption of large quantities of flesh increases the excretion of Calcium. A low body content of Calcium is favourable to hay fever, the administration of Calcium Chloride acting beneficially. A retention of Potassium and a greater output of Sodium results from increased Calcium in the diet.—J.C.S.A. i.,/1922,1210. 10 grain doses *t.d.* have been advised.

TUBERCULOSIS. The importance of Calcium has been dwelt upon by numerous writers. In various parts of the world workers *in lime and Plaster of Paris, found in general to be immune.* In the treatment of tuberculosis it is needed not only for healing properties but also to overcome hypo-alkalinity or acidosis, which is almost always present. Patients should have plenty of vegetables and fruits, milk and eggs, and if possible shells of fresh raw eggs ground to powder—boiled or stale will not do.—F. Tweddell, Med. Rec. per Medical World, April, 1922.

Weekly intravenous injections of 5 Cc. of a 5% solution of Calcium Chloride, over a period of 102 weeks, healed tuberculous intestinal ulcers.—Jl. Intrav. Therap., '26,15. *Vide* also *antea*, p. 255.

PLEURITIC EFFUSION. Calcium Chloride *per os* found to have remarkabl effect in treatment. 30 Gm. of the dry granulated salt (*Caution*: an extra ordinary dose!) in 100 Cc. of water taken in a little coffee and milk the bes method of administration.—per Pr. Sept. '23,233.

INFANTILE TETANY well treated by 30 grains *per os* every 4 hours; rapi cessation of convulsions. Cod Liver Oil as well and after.—S. Graham an G. H. Anderson, B.M.J. i./24,903.

In children who develop heart disease, the sequence is poor food, the rheumatism, and finally heart disease. The importance of Calcium in th diet.—G. Arbour Stephens, Pres., Oct. '26,342.

URINARY INFECTIONS, particularly colon bacillus pyuria, cured by renderin the urine acid by a daily fractionated dose of Calcium Chloride in 2 litre of water, the treatment being based on the assumption that the pH contro the growth of bacteria. Contraindicated if kidneys are pathologic or if ther are signs of diabetes.—per Jl. A.M.A. ii./25,1768.

NEPHRITIS and ŒDEMA successfully treated with Calcium Chloride, 2½ t 4½ drachms daily, free diuresis occurring.—B.M.J.E. ii./24,62.

SCURVY.—In the siege of Kut-el-Mara Calcium Chloride was urgentl needed by the Mesopotamia forces for treatment of scurvy. It was "home made" by acting on lime with Hydrochloric Acid, of which latter there wa abundance (used with Potassium Chlorate for chlorinating water). Nearl 2 lbs. of this home-made Calcium Chloride was issued daily for 2½ months.— Col. Hehir, Commission appointed to inquire into the Mesopotamia Campaign —C.D. i./17,576.

ECZEMA treated with a 6% Calcium Chloride ointment: found to b effective.—G. Lampronti, per P.J. i./23,573.

VIPER BITES well treated with 3% solution intravenously.—C. Kobayash per Jl. Trop. Med., May 1/22,121.

An interesting discussion on the therapeutic uses of Calcium Salts at th meetings of the **B.M.A. 1927**.—B.M.J., ii./27,777 *et seq.*

For further notes on Lime Salts see Calcium Lactate.

Liquor Calcii Chloridi B.P. 1885, was 1 to 5 of distilled water

Dose.—15 to 45 minims (1 to 3 Cc).

Elixir Calcii Chloridi. *Dose.*—1 to 2 drachms, best given 1 hou after a meal.

Calcium Chloride 60 grains, Orange Syrup and Syrup of Tolu o each ½ ounce.

Mistura Calcii Chloridi, L.I.P.

Calcium Chloride 10 grains, Syrup of Ginger ½ drachm, Wate to ½ ounce.

Gelatinum Calcii Chloridi. (*cf.* Gelatinum for further Gelatin Injections)

Dose.—5 to 7 Cc., warmed in a water bath and cooled to a suitable temperature. To arrest hæmorrhage injected into the gluteal region.

This contains Calcium Chloride 5%, with Gelatin 5 to 10%. The additio of Gelatin stated to avoid the necrotic effect of the Salt.—Pr. May, '13,902.

Shock treated with an injection of Calcium Chloride 0·5 Gm., Glucose 1· Gm., Gelatin 0·3 Gm. in 10 Cc. Water. Ampoules kept ready, melt whe required, give as such or dilute with tap water.—J. E. R. McDonagh, Pr Aug., 1920.

Calcii Iodidum. CaI_2=293·934. *Syn.* **Calcidin.**

Dose.—2 to 4 grains (0·12 to 0·25 Gm.). Given in *dilute* aqueou solution. Deliquescent crystalline powder. On exposure to light o air will give off Iodine; best preserved in amber bottles. It i stated to have been introduced into medicine by G. Arbour Stephens Excellent results in foul ulcers and chilblains.

Eczematous patch on tibia measuring 7 × 3 inches cured by 4 grai doses thrice daily. Diabetic ulcer on foot also seat of recurren mammary carcinoma were treated with it.

VARICOSE ULCERS.—Calcium Iodide in 10 grain doses *t.d.*, between meals and an Ointment containing Allantoin or Comfrey will probably heal these in a month. A few skin grafts prior to the Ointment to expedite.—B.M.J. ii./12.1740.

Elixir Calcii Iodidi.—*Dose.*—1 drachm (4 Cc.). Calcium Iodide 3 grains, Aromatic Elixir 1 drachm. Employed in tuberculosis.

Calcii Peroxidum. *Syn.* CALCII SUPEROXYDUM. GORIT. CaO_2 = 72·07. It may be made + $8H_2O$.

Dose.—3 to 10 grains (0·2 to 6 Gm.) daily.

A white crystalline powder slightly soluble in water, evolving oxygen. It explodes if mixed with Glycerin or Formalin.

A useful intestinal antiseptic, given in milk, for infants, *e.g.*, in summer diarrhœa. Recommended in hyperacidity; also in soil contaminated wounds.

Under the name "**Calox**" it is contained in a dentifrice. Magnesium Peroxide 5 to 10% added to a prepared or precipitated chalk has also been used.

Experiments on rabbits showed that Gorit has powers antagonistic to Hydrogen Cyanide. Germicidal power less than that of Hydrogen Peroxide.

Calcii Phosphas (*B.P.* '14). $Ca_3(PO_4)_2$=310·264. 'NEUTRAL' or 'TRIBASIC' CALCIUM PHOSPHATE, CALCIUM ORTHO-PHOSPHATE.

Dose.—5 to 15 grains (0·3 to 1·0 Gm.).

White powder made by interaction of calcium chloride with sodium phosphate and excess of ammonia at a boiling temperature. Insoluble in water; soluble in dilute hydrochloric and nitric acids.

Uses.—To supply lime to growing bones and to assist in general nutrition. It is also given to pregnant women for the same purpose.

Magnesium infiltration as result of lime depletion in chorea to be overcome by excess of this element, *e.g.*, Calcium Phosphate 5 grains well mixed with Milk Sugar 5 gr., *t.d.*, should be tried.—J. Aulde, L. i./13,640.

Calcii Phosphas Mono-acidus. FR. CX., PH. NED. V. *Syn.* DIBASIC CALCIUM PHOSPHATE, CALCIUM MONO-HYDROGEN PHOSPHATE.

$Ca_2H_2(PO_4)_2$, $4H_2O$ or $CaHPO_4$, $2H_2O$=172·137.

Dose.—10 to 30 grains (0·6 to 2 Gm.). Prepared by decomposing Calcium Chloride with Dibasic Sodium Phosphate.

Colourless crystals with slight acid reaction. Used in making Liquor Calcis Lactophosphatis, *q.v.*

Pepsodent. A dentifrice with an acid reaction due to Acid Calcium Phosphate.—L. ii./21,395.

Calcii Phosphas Di-acidus. FR. CX. *Syn.* MONOBASIC CALCIUM PHOSPHATE, OR ACID CALCIUM PHOSPHATE.

$CaH_4(PO_4)_2$, $2H_2O$=270·184. *Dose.*—5 to 20 grains (0·3 to 1·2 Gm.).

Deliquescent crystals, insoluble in alcohol.

Mix Calcium Mono-acid Phosphate 154 Gm. with Phosphoric Acid (50%) 200 Gm. to a paste, and leave to stand 1 hour at about 50° C., add water sufficient to make clear and boil ¼ hour. Evaporate to Sp. Gr. 1·40 (taken on the warm liquor) and leave to crystallise.—FR. CX. We have employed this Salt for some time past in making **Syrupus Tann-Iodo-phosphoratus** and **Vinum Tann-Iodo-phosphoratum**, *q.v.*

Calcii Saccharas. **Calcium Monosaccharate** is $C_{12}H_{22}O_{11}CaO =$ 398·246.

Dose.—8 to 30 grains (**0·5 to 2 Gm.**).

In colourless tufts, soluble in water. An antacid for dyspepsia specially for children; also as an antidote to carbolic acid poisoning in 10 times above doses.

Liquor Calcis Saccharatus. (*B,P.* '14.)

Dose.—15 to 60 minims (**1 to 4 Cc.**).

Prepared by interaction of slaked lime and sugar. Contain nearly 2% Calcium Oxide.

Calcii Hydras. $Ca(OH)_2 = 74·086$. Should be recentl made by action of water on calcium oxide. Has slight caustic action Is more soluble in cold water than in hot.

Liquor Calcis is given to infants with milk.

Warts (verruca plana) on the back of the hand are stated to hav been cured in a week by ½ pint a day.

Linimentum Calcis. (*B.P.* '14.)

Solution of Lime 1, Olive Oil 1; or with Linseed Oil 1, is known a

Carron Oil—*Syn.* LINIMENTUM CARRON. Mid. H. and U.S. X.

Eucalyptus Oil 1 to 2% is often added as antiseptic.

In the tropics Arachis and Sesame Oil are permitted.

Calcii Sulphas. $CaSO_4,2H_2O = 172·166$.

Dose.—20 to 30 grains daily (**1·2 to 0·2 Gm.**).

A heavy white powder soluble in water 1 in 390.

For phosphaturia is considered a specific; it may be well given with an equal weight of Heavy Magnesium Carbonate.

Dried Calcium Sulphate, $2CaSO_4,H_2O = 290·284$, so long as it remains dry, is used to make Plaster of Paris splints. Tw pounds require about one pint of water; this sets rapidly and firmly.

Moistening with 5% Dextrin Solution makes a strong dressing but sets slowly. Sodium Chloride 1% added hastens setting but 2% retards.

Plaster of Paris Bandages, 2, 2½ and 3 inches wide (6 yards). In sealed tins. **Crinoline Bandages** are used for these and fo silicating (*cf.* Sodii Silicas).

Calx Sulphurata (*B.P.* '14). *Syn.* CALCII SULPHIDUM CRUDUM; CANTON'S PHOSPHORUS. Contains not much less than 50% $CaS = 72·134$.

Dose.—¼ to 1 grain (**0·016 to 0·06 Gm.**) in pill.

Some forms of it shine in the dark and are used in luminous paint See P.J. ii./15,806; (CaS.) i./16,105, also Radium Luminous Paints.

Is prepared by reducing Calcium Sulphate by charcoal. A greyis powder with sulphuretted odour sparingly soluble in water with de composition. It thus represents the properties of Harrogate, Bare ges, Gilsland, and similar springs. Largely used for boils, car buncles, acne, scrofulous sores, especially in glands of the neck. I rarely purges even in 2 grain doses thrice daily. Some give small doses *every hour.*

In bronchitis and phthisis where sputum is tenacious and ropy, cough hard and prolonged—Calcium Sulphide liquefies sputum and makes cough easier. In abscess of the middle ear, urinary tract, acne and, wherever there is pus formation, Calcium Sulphide should be given. In follicular tonsillitis ½ grain may be given every hour until alleviation, then every two hours, said to act as specific. In zymotic diseases, Calcium Sulphide probably finds its most useful place. In the treatment of contagious diseases of childhood Calcium Sulphide seems to act similarly to Antitoxin,—that is, it increases the inherent power of the blood to destroy bacteria and their poisons. Should be given throughout the course of measles, scarlet fever, diphtheria and whooping-cough.—Clin. Med. Jan. 1911.

Reading that Calcium Sulphide is specific for FOLLICULAR TONSILLITIS, and having had this trouble for nine years, with only temporary disappearance of the lesions from medical treatment, a patient tried Calx Sulphurata, 1 grain pills, 3 per day. Supply of pills ran out in twenty days, but during this time tonsils had healed perfectly and there was no sign of relapse 60 days after last taking the pills. Extent of treatment not thought sufficient. Control of the disease also by Lactic Acid 25% solution as swab.—S. M. Klages.

Pilula Calcis Sulphuratæ, $\frac{1}{12}$, $\frac{1}{10}$, $\frac{1}{8}$, $\frac{1}{6}$, $\frac{1}{4}$, $\frac{1}{3}$, $\frac{1}{2}$, and 1 grain.

Tablets contain ¼, ½, and 1 grain. Keep in bottles.

In strumous ophthalmia, as well as in periostitis and alveolar abscesses has been found of service. For boils give 1 grain *t.d.*, increased to 8 grains *p.d.*

Stearettes of Calcium Sulphide, freshly made, should prove useful in suppurative conditions in fairly large doses, *e.g.*, 1 grain in each. They would avoid decomposition in the stomach.

Lotio Calcis Sulphuratæ.

Slaked Lime 4, Sublimed Sulphur 4, Distilled Water 35. Boil together, evaporate, and filter, to produce 20 of solution. Diluted with an equal quantity of warm water is a remedy for itch, which it will cure in half an hour. It resembles in composition **Vlemingkx' Solution.** (Calcium Sulfuratum Solutum.—P. Helv.).

For eczematous itching, baths of the Solution, 1 tablespoonful to every 7 gallons of water, have been used.

In scabies found too irritating for use. Not equal to a weak Sulphur Ointment in curative effect.—B.M.J. ii./17,468. Freshly precipitated Sulphur has been used by washing the patient first with a dilute Sodium Hyposulphite Solution and then with dilute Hydrochloric Acid. Subsequently to allay irritation, Sulphur Ointment.

Sulphurated Lime Depilatory.

Milk of lime charged with sulphuretted hydrogen.

Syrupus Sulphatum (H. P. Symonds).

Dose.—½ an ounce (15 Cc.) contains appropriate doses of the sulphates of Berberine, Quinine, Iron, Potassium and Sodium. Is useful for boils, &c. Taken twice or thrice daily

Pilula Sulphatum.

The salts of half-an-ounce of this syrup in two pills.

CAMPHORA.

$C_{10}H_{16}O=152{\cdot}128$.

Dose.—2 to 5 grains (**0·12 to 0·3 Gm.**).

Camphor is a white crystalline substance obtained from *Cinnamomum camphora* (*Lauraceæ*) in Formosa and Japan. (ESSENTIAL OIL OF CAMPHOR is of a pale straw-colour or darker, with fragrant odour, Sp. Gr. 0·898 to 0·920; consists principally of a terpene, with about 1 in 4 or less of camphor in solution, the heavy variety is preferred for massage in rheumatism. The heavy Oils range from 0·975 to 1·025, 50 to 75% Safrole. Light fractions practically devoid of same.—P.J. ii./08,62.) Camphor is sold in bells, and in ¼, ⅓, ½, 1 and 4 ounce cubes, also as **Flowers of Camphor.** The latter is a convenient form for dissolving.

Melting Point 175° C., Boiling Point 204° C.—P. Jap.

Soluble in water, 1 in 700, in alcohol 90% 1 in 1¼ (more soluble in absolute alcohol), in ether 12 in 7 barely, chloroform 4 in 1 scarcely, volatile and fixed oils (olive 1 in 3), in glacial acetic acid 2 in 1.

It is rendered more soluble in water by the presence of carbonic acid, acid carbonate and carbonate of magnesium, sugar, and myrrh, and less soluble by bromide of potassium, liquor potassæ, sulphate of magnesium, alkaline carbonates and many other salts.

Camphor, when mixed in certain proportions with many crystalline substances, causes mutual liquefaction of the two—*e.g.*, camphor 4, phenol 12, and water 1 (*see* Acidum Carbolicum); camphor 1, and chloral hydrate 1 (*see* Chloral Hydras); camphor 2 and menthol 3 (*see* Menthol), camphor 1 and thymol 1 (*see* Thymol); camphor 2 and β-naphthol 1 (*see* Naphthol); camphor 2 and salol 3 (*see* Salol); camphor and butyl-chloral hydrate liquefy when heated, but solidify on cooling; so will camphor 84 and salicylic acid 65 (*see* Camphora Salicylata). Camphor is powdered by rubbing with a few drops of alcohol.

Camphora Synthetica. P.G. VI. may be used in place of Natural Camphor in Germany. *Further details see Vol. II.*

Flavoring.—Extractum Glycyrrhizæ Liquidum.

Uses.—Sedative, anti-spasmodic, carminative, expectorant, diaphoretic, anaphrodisiac, antiseptic, given internally to abort colds in the head, to relieve hiccough, for whooping cough, diarrhœa, chordee and lumbago. Is injected as a stimulant for patients *in extremis.*

For arteriosclerosis and for old patients with heart trouble continued use of camphor internally is of value.—L. i./18,143.

Meningitis caused by camphor liniment has been treated by caffeine injection. Cases of Camphor habit have been reported.

Caution.—It is dangerous to place camphor or menthol, *e.g.*, a 20% ointment, into the nostrils of an infant. A small quantity o this camphor ointment applied in this way for coma in an infant o 9 months caused immediate collapse with signs of a severe syncopa attack.—Pres., July, 1913.

Besides the official preparations, **Camphor Water,** (Camphor Jule or Mixture) 1 in 1,000. Liniment* 1 to 4 Olive Oil (U.S. orders sam strength in camphor to be prepared with Cotton Seed Oil*—Oleum Gossypii Seminis expressed from *Gossypium herbaceum* and other species—*Malvaceæ*), **Ammoniated Liniment** (—*Poisonous, not to be taken*) 12½%, with Lavender Oil 0·5%, and Strong Solution of Ammonia 25%, Alcohol 90% *q.s.*, **Spirit** 10% (and U.S., *Syn.* **Teinture de Camphre Concentrée, Alcool Camphré** FR. CX.), and **Compound Tincture** 0·3%, the following are in use :—

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* In preparing this, '*English-refined*' flowers should be rubbed through sieve, and dropped into the oil at 70° to 80° F. Foreign flowers give mudd solution. **Oleum Camphoræ Forte, P.G.V.** is the same strength.

Examination of camphorated oil for camphor substitutes.—P.J. i./09,3.

Aqua Sedativa. **Eau Sedative.** LOTION AMMONIACALE CAMPHRÉE (FR. CX.).

Spirit of Camphor (10%) 10, Sodium Chloride 60, Solution of Ammonia 60, Distilled Water 1,000, all by weight. As a compress for migraine and rheumatism, and to contusions.

(*Note.*—**Teinture de Camphre Faible,** FR. CX. is 1 in 40 Alcohol 60%.)

Camphor Ball.

Spermaceti 4, White Wax 12, Oil of Almonds 5; melt in a water bath and add Flowers of Camphor 4. Dissolve, and when nearly cold pour into moulds. Useful for chapped skin.

Camphorated Chalk.

Flowers of Camphor 1, Precipitated Calcium Carbonate 7. Mix, and sift for use as a dentifrice.

Camphorated Carbolic Acid, *vide* **Acidum Carbolicum.**

Elixir Camphoræ. *Dose.*—½ to 1 drachm (**2 to 4 Cc.**).

Spirit of Camphor 10, Syrup 5, Distilled Water 1. Contains 1 in 16. It mixes and diffuses well in water.

Æther Camphoratus, P. Helv. Camphor 1, Æther 9. Dissolve.

Oleum Camphoratum, Huile Camphrée Fr. Cx. 1 to 9 of Olive Oil.

Injectio Camphoræ Hypodermica. *Dose.*—10 to 30 minims (**0·6 to 2 Cc.**).

Camphor 1, Sterile Olive Oil to 5.

In pneumonia 25 minims has been given as a general rule to start with, but much larger doses have been employed—even 12 Cc. of a 20% solution.

Huile Camphrée Sterilisée pour Injection, Hypodermique. FR. CX. NOUV. SUPP., 1926. *Dose.*—Max. during 24 hours, 100 Cc. *Caution.*—A 10% w/v solution in Olive Oil.

Injectio Camphoræ Hypodermica (Aetherea) L.H.

Camphor 2 grains, Ether 3 minims, Olive Oil to 10 minims.

Sterules, Hypodermic, contain Camphor 1½ and 3 grains in Sterile Olive Oil; **Sterules of Camphor** ½ grain, **with Ether** 15 minims; also **Sterules** of Camphor 3 grains with Guaiacol 2 grains, employed in phthisis.

N.F. uses Cottonseed Oil containing not more than 1% of free fatty acid as a solvent for the Camphor.

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* *Wesson Oil*, a high grade of Cotton Seed Oil, largely used in America as Salad Oil, said to be superior to Olive Oil for making Mayonnaise.

Curschmann's Solution.

Dose—15 minims (1 Cc.) increased if necessary.

Camphor 2, Ether 3, Olive Oil 7.

Sterules of Curschmann's Solution 1 Cc.=0·2 Gm. (3 grains) of Camphor are prepared.

CARDIO-VASCULAR DISEASES treated by Camphor. During the course of chronic myocarditis with simple cardiac insufficiency, changes in rhythm and auricular fibrillation, no drug can compete with Camphor in sustaining activity of the heart and steadying the pulse. *Dose*, 0·1 Gm. (1½ grains) in oil hypodermically once or twice daily—or *per os*. Not merely a remedy in the hour of death, but used intelligently can be given with benefit throughout the entire course of various cardiac and vascular diseases.—L. ii./17,466.

In HEART FAILURE in typhoid and pneumonia (and other causes, *e.g.*, gassing by chlorine and where the patient is *in extremis*), it is one of the most valuable excitants we possess.—U.S.D.

GASTRIC HÆMORRHAGE is stated to have been arrested by the injection. Not suited when there is insufficient active carbohydrate metabolism.

SCIATICA and NEURITIS well treated.—Jensen, B.M.J.E. i./20,17.

Caution.—Various amounts (30 to 300 Cc.) of 1 to 10% Sterile Camphorated Oil have been injected in this way. A case recorded of acute poisoning from 170 Cc. of 10% Solution after an operation of the uterus. 1% may be safe and not more than 300 Cc. of this solution.—L. ii./12,546.

Urticaria following the use of Camphor injections.—per Jl. A.M.A. ii./25, 476.

INTRAVENOUS INJECTION of Camphor gives remarkable results in severe hæmorrhage and circulatory failure, whether due to shock or septic absorption—more certain than Sodium Chloride, Normal Saline or Glucose solutions. B.M.J.E. i./26,57. *The information as to dose and formula is insufficient.*

Ⓟ **Pigmentum Camphoræ Chloral et Menthol.**

Acute fibrositis. In early stage hot fomentation useful. Afterwards one of the best applications is Camphor, Chloral Hydrate, and Menthol, *p. aeq* , painted on and rubbed in gently with the fingers—or paint with Iodine Tincture, and apply hot poultices or very hot fomentation.—A. P. Luff B.M.J. i./13,858.

Pilula Camphoræ.

The most suitable excipient to form camphor into pills is about ⅓ its weight of powdered curd soap and a few drops of alcohol, or a little lard in a warm mortar.

Tablets, Camphor and Quinine. Camphor ¼ grain, with Quinine Acid Sulphate 1 grain. To check catarrh, and as a tonic.

Spiritus Camphoræ Fortior. *Syn.* RUBINI'S SOLUTION.

Flowers of Camphor 1, Absolute Alcohol (by weight) 1. *Dose* for diarrhœa.—2 to 5 drops on sugar every 5, 10, or 15 minutes, according to the severity of the symptoms.

Trochisci Camphoræ contain 2 grains in each.

Wool, Absorbent, Camphorated (33%).

Acidum Camphoricum. PH. NED. V., P. HELV., P. JAP. IV

$C_8H_{14}(COOH)_2=200{\cdot}128$.

Dose.—10 to 20 grains (0·6 to 1·2 Gm.) in cachets.

Formed on oxidation of camphor with nitric acid (test for free nitri acid with ferrous sulphate). Odourless crystals, M. Pt. 187° C

Soluble in water about 1 in 200, in alcohol 90% about 1 in 1½, and in fatty oils about 1 in 10. It is dextrorotatory.

Uses.—With success in night sweats of phthisis, also in cystitis by intravesical injections of 2% aqueous solution with 11% alcohol and as an intestinal disinfectant. Further in solution as a local astringent for nose and throat, also for diarrhœa. In skin affections saturated solution in dilute alcohol locally useful.

Camphora Monobromata, $C_{10}H_{15}BrO = 231{\cdot}036$.

P. Helv. directs—gradually combine Camphor 15, Bromine 16 in a mortar. Also official in P. ITAL IV., P. Jap. and PH. NED. V.

Dose.—2 to 10 grains (0·12 to 0·6 Gm.) in pills, with ⅓ of its weight of curd soap and proof spirit *q.s.*

In colourless prisms, soluble in ether, alcohol, and fixed oils, insoluble in water. Should be soluble in sulphuric acid with nearly colourless solution. M. Pt. 76° C.—P. Jap. It is used as a hypnotic, and of value in epileptic vertigo, cases of petit mal, chorea, hysteria, delirium tremens, whooping-cough and asthma, and for erections in gonorrhœa.

Tablets contain 1 grain (0·06 Gm.). **Perles** 2 grains (0·12 Gm.).

Elixir Camphoræ Monobromatæ.

Monobromated Camphor 1, Spirit of Cinnamon (1 in 10) 10; dissolve and add Red Elixir 60, Syrup *q.s.* to 100. *Dose.*—½ an ounce (15 Cc.).

Enuresis is treated with this combined with belladonna, where potassium bromide is unsuitable.

Camphora Salicylata. *Dose.*—1 to 5 grains (0·06 to 0·3 Gm.), in pill, with suet or lard.

Camphor 56, Salicylic Acid 44, combined. Soluble about 1 in 20 in oils and alcohol. As ointment in skin affection.

Trochisci Camphoræ Salicylatæ Compositi. Camphor Salicylate 2 grains, Sodium Sulphate 4 grains. One thrice daily an hour before food. To ward off a cold.

***Coramine** (T.M. 437910). *Syn.* PYRIDINE-β-CARBONIC ACID DIETHYLAMIDE.

Dose.—1 to 2 Cc. of the liquid, with a little water orally. 1 to 2 ampoules, each 1·1 Cc., hypodermically, intramuscularly, or intravenously.

Uses.—In shock, heart asthenia following infectious diseases (pneumonia etc.) arteriosclerosis, renal affections, bronchial asthma, emphysema, poisoning through narcotics, and asphyxia of the new-born.

A substitute for Camphor, Strychnine and Caffeine, since in cases of collapse it has a stimulating action on central nervous system and on the circulatory and respiratory apparatus. It has the advantage of being water-soluble and non-cumulative. Pharmacological and clinical results are given.—E. S. Faust, L. i./25,1336. C.D. i./25,880; B.M.J. ii./25,910.

P1 CANNABIS INDICA (*B.P.* '14). U.S.

(P1 *Cannabis and Resins from it—vide Poisons Schedule.*

Cannabis, Resins and preparations of the resins are included i *the* 1925 *D.D.A.*, ***but the Act is not in operation at tim of going to Press.***

The dried flowering or fruiting tops of the pistillate plant *Cannabis sativa* (*Urticaceæ*). It is grown in India (not deprived resin).

The masses obtained in European commerce are called Guaza. Gan differs slightly and is more active. Bhang or Hashish consist of the leave small stalks and fruits.

The therapeutic value of the drug is contained in the resin. It ap pears to contain no peculiar alkaloid. The constituent **Cannabin** becomes oxidised on exposure to the air. For use in medicine should be as fresh as possible. It is a powerful drug.

A high export duty is imposed on it. *N.B.—The B.P.* '14 *dose Extract has proved toxic.*

History of Cannabis.—Sir David Prain, B.M.J. ii./25,963.

For details of Assay and Physiological Examination, see Vol. II.

'**Mariahuana**'—the official name for Cannabis Indica in Mexico. Larg quantities seized by Customs. Forbidden import and growing.—L. i./26,42

Antidotes.—Stomach pump, emetics, stimulant draughts, arti ficial respiration, coffee. No death from cannabis is on record.—H

Effects of large doses of Cannabis Indica depicted by the author's experi ment on himself. There is a distinct unmistakable sex tinge to its action exhilaration and emotion.—A. Schneider, per P.J. i./23,389.

Flavoring.—*Vide* Tinctura.

Uses.—For chordee and asthma, also as an aphrodisiac, and is suc cessful in migraine. Is a narcotic and anodyne, but may give peculia dreams and even delirium.

It is useful in dysmenorrhœa, especially with Gelsemium; with Nu Vomica in incipient delirium tremens, nausea, and paroxysmal colic supraorbital neuralgia, cough of phthisis and for whooping-cough. I is of great use combined with strychnine, with chloral in chorea i mental worry and restlessness. Should be given in small and fre quent doses. It is *the* remedy for menorrhagia.

In gonorrhœa (urethritis acuta anterior) Cannabis internally wit Hyoscyamus is useful before patient is in condition for injection

P1 **Extractum Cannabis Indicæ** (*B.P.* '14). *Syn. Extract d Chanvre Indian.* Fr. Cx. Nouv. Supp. '26. In U.S. is *assaye biologically.*

Dose.—¼ to 1 grain (**0·016 to 0·06 Gm**,), in pill with lycopodium. A alcoholic extract, of which 1 dissolved in alcohol 90% *q.s*, to 20 forms—

Ⓟ **Tinctura Cannabis Indicæ** (*B.P.* '14). (A 1 in 10 of alcoh Tincture was in U.S. IX.; assayed biologically.) *Dose.*—5 t 15 minims (0.3 to 1 Cc.), in some mucilaginous fluid.

Flavoring.—Glyl Lavandulæ, Glyl Amygdalæ Amaræ, Gly Pini, Syl Vanillæ; Syrupus Aurantii, Syrupus Zingiberis.

Tablets equal 5 minims.

Ⓟ **Fluidextractum Cannabis, U.S.** 1=1. An alcoholic percolate assayed biologically. *Dose.*—1½ minims (**0·1 Cc.**).

Ⓟ **Pilula Extracti Cannabis Indicæ,** contain ¼, ⅓, ½ and 1 grain. In sciatica a pill of Cannabis Extract and Hyoscyamus Leaf in powder of each 1 grain may help. Local treatment. *Dose.*—2 to 5 during the day.

Ⓟ**Cannabin Tannas.**

Dose.—2 to 10 grains (**0·12 to 0·6 Gm.**) taken an hour before bedtime in a pill or in sal volatile and water.

A brownish powder, soluble in alkaline water and alcohol, and is said to be useful hypnotic and is specially valuable in nervous sleeplessness and in acute mania, also for dysmenorrhœa and menorrhagia.

Ⓟ**Pilula Cannabin Tannatis,** 2, 3 and 4 grains.

In pruritus vulvæ 3 to 5 grains three or four times in 24 hours of benefit. —B.M.J., i./12,472.

P1 CANTHARIS.

P1 *Cantharides and its poisonous derivatives.*

Ⓟ *Cantharides, Tincture and all vesicating liquid preparations and admixtures of (and N.B. last clause of Part II. of Schedule).*

Syn. LYTTA; SPANISH OR BLISTERING FLY.—P. Jap. IV. has *Epicauta Gorhami* with 1% Cantharidin.

Dose.—$\frac{1}{16}$ to ½ grain (**0·004 to 0·03 Gm.**) in pill. Better given as tincture. FR. CX. Max. single dose ¾ grain. Max. in 24 hours, 2 grains.

Antidotes.—Emetics, stomach pump, white of egg (no fats); sedatives.

Cantharidin poisoning. Crystals, probably 1/50th grain, taken by a medical student out of misplaced curiosity. Caused blood in urine and albumin.—Recovery.—C. H. Andrewes, L. ii./21,654. *See also* note under Liquor Epispasticus.

For note on Estimation of Galenicals, see Vol. II.

A study of *Cantharides* in practical pharmacognosy.—T. E. Wallis, P.J., ii./27,167.

Uses.—Externally vesicant, irritant and powerful counterirritant. Used in pleurisy, pericarditis, meningitis, neuritis, applied above the stomach to stop vomiting and in rheumatoid arthritis, (*v.* Emplastrum).

Internally is said to have aphrodisiac properties. Has been given in lupus and in chronic gout. Caution, avoid irritation of the kidneys. Hæmaturia is checked by five-minim doses of tincture. It is of service in incontinence.

In cardiac dropsy Cantharides is one of the most useful means of promoting diuresis. It acts on the secreting cells of the tubules, and the effects manifest themselves quickly. Dose of Tincture may be 2, 3 or 10 minims according to age, given several times daily. Can usefully be added to a mixture containing Caffeine, Tincture of Strophanthus and Spirit of Nitre.

P1 **Mylabris phalerata** and *sp.* are not now official but were in I.C. Add. for making external applications in India. These contain about 1 to 2%, or more than double the amount in Cantharides, of the neutral principle—

P1 **Cantharidinum** (*B.P.* '14), P. Ital. IV., P. Helv.
$C_8H_{12}O(CO)_2O = 196{\cdot}096$.

Cantharidin is the Lactone of Cantharidic Acid, in flat glistening rectangular prisms, which melt at 210° C. approx. (P. Ital. 218°), and volatilise in very irritating white fumes. ***Soluble*** 1 in 56 of chloroform, 1 in 38 of acetone, and about 1 in 150 of acetic ether. Soluble also in ether, benzene, glacial acetic acid, 1 in 1,000 of absolute alcohol, and about 1 in 400 of water (Greenish).

Poisoning Effects and Antidotes, see *Cantharis.*

Uses.—Solutions of Cantharidin, as well as other preparations of cantharides, are employed for stimulating the growth of the hair, in alopecia, and preventing its falling off.

Ⓟ **Acetum Cantharidini** (*B.P.* '14) contains Cantharidin 1 in an Acetic Acid solution *q.s.* to 2,000. Replaces **Acetum Cantharidis** B.P. '98.

Ⓟ **Linimentum Crinale** (Squire).

Cantharidin 1 grain, Acetic Ether 6 drachms ; dissolve with gentle heat, and add Alcohol 90% 6 ounces, Castor Oil 2 ounces, Lavender Oil 15 minims. It is better to dilute this with an equal quantity of spirit, and the head should be washed after applying it a few times, to prevent the cantharidin accumulating.

Ⓟ **Emplastrum Cantharidini** (*B.P.* '14), contains Cantharidin 1, in a basis of Beeswax 225 and Wool Fat *q.s.* to 500 previously melted together. Replaces ⓅEmplastrum Cantharidis B.P. '98. The wax may be decreased or increased if necessary.

Ⓟ **Emplastrum Calefaciens** B.P. '98.—Was $\frac{1}{10}$ strength of this.

Ⓟ**Emplâtre Mouches de Milan** used in France is similar to Emplastrum Cantharidis B.P. '98.

In rheumatoid arthritis prolonged counter-irritation is of value. Cantharides plasters 4 in. or 5 in. by 2½ in. painted over immediately before application with Cantharides Liniment or Liquor Epispasticus to ensure rapid action, are applied at bed time one on each side of the seventh cervical vertebra or the twelfth dorsal, according as the joints of the upper or lower extremities are most affected—leave on for 24 hours. If the patient's kidneys are unhealthy the electric cautery should be used instead of Cantharides. After blistering and cutting away the loose cuticle a bread poultice made with Boric Lotion is applied over night. Next morning dress with fresh Savin ointment and repeat every eight or ten days—soak well with Boric Lotion in removing. Twenty drops of Laudanum at night useful. Pain and swelling of joints generally much relieved after three or four days. For further details of the method (general treatment of patient) refer to Latham, P.R.S.M. Baln. Sectn., May, 1910, p. 110, or L. i./10,929.

The theory is that the changes in the joints and muscular wasting are due to active and destructive lesions in the spinal cord, and especially the cervical and lumbar enlargements. See also B.M.J. i./13,864.

Ⓟ **Emplastrum Vesicans.**

Cantharidin 1, Chloroform *q.s.* ; heat to dissolve and add to Yellow Wax, and Wool Fat, in equal portions, previously melted together, 499.

Ⓟ **Liquor Epispasticus** (*B.P.* '14) is now made about same strength as B.P. '98, using Cantharidin.

Effects of painting the side with the Liquor to the size of a surface measuring 7 by 2¾ inches—in error. Blood, albumin, kidney cells passed in the urine.—L. ii./08,800.

Ⓟ **Collodium Vesicans** (*B.P.*'14) is approximately the same strength.

Lotio Ammoniæ et Cantharidini Mid. H.

Strong Ammonia Solution 1, Spirit of Rosemary 2, Alcohol 90% 4, Tincture of Cantharidin 2, Almond Oil 6.

Ⓟ **Linimentum Cantharidis Compositum,** W.H.

Liquor Epispasticus 60, Glacial Acetic Acid 20, Rosemary Oil 3, Castor Oil 90, Alcohol 90% to 480.

Ⓟ **Emplastrum Cantharidis Liquidum,** a special preparation, is painted on with a brush. It dries rapidly, forming a pellicle on the skin. Effect more certain than with a plaster.

The size of a blistering plaster is usually 1 inch square—rarely more than 2 inches square. For applying behind the ear the shape should resemble that of the space formed when the tip of the forefinger comfortably touches the tip of the thumb.—Marshall.

Ⓟ **Oleum Cantharidatum. P. Jap. IV.**

Macerate Cantharides in powder 3, in Olive Oil 10, on the water bath for 10 hours with occasional shaking. Strain.

Ⓟ **Tinctura Cantharidini** (*B.P.* '14) 1 in 10,000; is approx. 1/7 strength of F.I. *Dose.*—2 to 5 minims (**0·12 to 0·3 Cc.**). U.S. 1 of Cantharides in 10 of Alcohol (94·9% vol.) containing Glacial Acetic Acid ½. *Average dose* 1½ minims.

Fr. Cx. 1 of Cantharides in 10, Alcohol 70%. (F.I.) Max. single dose 9 minims and max. during 24 hours 25 minims approx.

F.I. (Second) recommended 0·06% Cantharidin.

Ⓟ **Unguentum Cantharidini** (*B.P.* '14).

Contains Cantharidin 1, dissolved by means of Chloroform in Benzoated Lard. Strength 1 in 3,000. Is about ⅔ strength of Unguentum Cantharidis, B.P. '98.

One part diluted further with two of soft paraffin forms a useful pomade for stimulating growth of the hair.

Erasmus Wilson's Ⓟ **Unguentum Stimulans** is described as consisting of 1 of Cantharides in 5 of plain lard.

Ⓟ **Unguentum Cantharidin cum Hydragyro Compositum** is sold as 'Pomade Max.'

Ⓟ **Unguentum Hydrargyri Oxidi Rubri et Cantharidis,** W. H. Blistering Liquid 15 minims, Red Mercuric Oxide Ointment 1 ounce.

P1 **Potassii Cantharidas.** Fr. Cx. $(+ 1H_2O)$.

$C_8H_{12}O(COOK)_2,2H_2O=326\cdot32$.

Dose.—1/400 to 1/200 grain (**0·00015 to 0·0003 Gm.**) hypodermically in very dilute solution. In minute white needles, soluble 1 in 25 of water. Has properties representative of Cantharidin, *q.v.*

A Solution of Potassium Cantharidate,—Cantharidin 1 grain, Potassium Hydroxide 1 grain, Water 300 minims, *i.e.*, equivalent to Liq. Epispasticus,—is used successfully for tightening loose drums. This is diluted for use with Glycerin and Water equal parts. Numerous cases of deafness from various causes treated and markedly improved.—C. J. Heath, 'The Nature and Causes of Catarrhal, "Throat" or Hereditary Deafness.' May, 1912.

CAOUTCHOUC (B.P. '98).

India-Rubber. *Syn.* Elastica.

The prepared milk-juice of *Hevea brasiliensis* (*Euphorbiaceæ*) and other species; known in commerce as Pure Para Rubber.

Preservation.—The best means of preserving rubber goods is to immerse completely in distilled water. Lime Water, Alkaline Solution, Glycerin Solution, and Boric Acid Solution were tried in addition, with the above expression of opinion.—C.D. i./14,73.

Liquor Caoutchouc (B.P. '98).

Caoutchouc 1, Benzol 10, Carbon Bisulphide 10.

In making this liquor it saves time to treat the rubber with the carbon bisulphide alone for an hour or two to form a jelly, then the benzol may be added and the preparation be ready in 24 hours. May be mixed with :—

Salicylic Acid 5%, Pyrogallic Acid 10%, Boric Acid 5 and 10%, Aluminium Acetate 1%, Ichthyol 5 and 10%, β Naphthol 5 and 10%, Capsicin 1%, Chrysarobin 10 and 20%, Bismuth Subgallate 5%,—whilst 'sticky' dust with a little Talc—thus used the 'patch' is hardly noticeable.

Bandages of rubber are (i.) webbed with strands of rubber; (ii.) Statham's porous; (iii.) Martin's (solid) perforated and non-perforated; (iv.) Elastic Circular Stocking and India-rubber Webbing.

Bougies of solid elastic gum :—

With bulbous end = à Boule, in sizes 1 to 16.
,, ,, silk web ,, ,, 1 to 16.
Conical pointed in shape ,, ,, 1 to 12.
Cylindrical, not tapered, various textures and materials—Sizes 1 to 16
Æsophageal Bougies are bulbous, conical and cylindrical, of elastic gum.—Sizes 10 to 24.

Catheters.—Elastic gum, black and webbed, or silk web—
Bulbous (à Boule), sizes 1 to 16.
Coudé (bent at end) also Bi-Coudé with two bends.—Sizes 5 to 12.
Cylindrical.—Sizes 1 to 15, with or without wire Stilettes, and sizes 5 to 12 with solid or hollow ends.
Conical (simply pointed, *i.e.*, tapered), with wire Stilette.—Sizes 1 to 12.

Catheters, Soft Rubber.—Those in demand are in lengths of 13 and 16 inches respectively. They are supplied with and without funnels, and the sizes vary between 4 and 12.

Belfast linen Catheters are also prepared.

Web Catheters may be sterilised by boiling in nearly saturated solutions of Ammonium Sulphate or Sodium Chloride, washing afterwards in sterile water.

Catheters, Female, are of glass, straight or curved, metal, or soft rubber.

Dental Rubber, manufactured of pure para rubber and coloured. This is supplied in various shades of colour, *e.g.*, white, pink, red, orange, black. The varieties in commerce are designated 'Samson,' 'Doherty,' 'Gold Dust,' Ash's 'Whalebone,' and Jamieson's 'Horn.' The rubber is hardened by vulcanisation, and used to form a frame to carry artificial teeth. In vulcanising most rubber, especially Ash's, raise the temperature gradually until 315° F. or 100 lbs. pressure is obtained. Maintain this temperature or pressure 75 minutes to complete vulcanising process.

Drainage Tubing is of various dimensions, and is supplied in Carbolised solution in glass tubes.

Gloves, Surgical, are prepared smooth and rough surface. We had occasion to submit a brand known as the '**Veedip**' to sterilisation tests (1927) and found same to withstand repeated heatings with highly satisfactory results comparative with ordinary rubber gloves. A brand termed **Tensile** is made under Patent 208235.

Gutta Percha Tissue is prepared from Gutta Percha, the dried milky juice of *Palaquium oblongifolium* and other trees belonging to the *N.O. Sapotaceæ*. Contains about 80% gutta similar to that of caoutchouc. The tissue has been used after sterilising in spirit as a wound-dressing. It is not flexible like indiarubber. It cannot be vulcanised by heating with sulphur unless it is first melted with a proportion of indiarubber.

The principal districts of supply are Pahang, Kelentan, Siak, Bolungen and Sarawak. Small quantities are also exported from Siam and Manila, and a lower grade from Nigeria. From Borneo is obtained the well-known 'leaf gutta'; this is extracted from the leaves and small twigs of the tree, and is boiled, cleaned, and pressed into slabs and cakes, considered by some to be the best. Unfortunately on keeping it oxidises and becomes brittle. The same applies to all varieties more or less. The resin obtained when extracted is used again in 'reclaiming' work. Gutta percha is the balata of the old world, as balata is the gutta percha of the new world. A similar juice or gutta percha has been produced recently in South America from Iquitos and Manaos, in Peru. It is in the experimental stage, as the residue or resin is found to be too hard or brittle, but the product (*i.e.*, hydrocarbon) is the same as found in gutta percha of the East Indies.—C. D. Commercial Compendium.

Macintosh or **Waterproof Sheeting,** 44 inches wide is supplied:—1. Double texture and double width. 2. Having rubber on both sides.

✱**Vulpro** (T.M. 460807, Cl. 40) Sheeting is made by a new process, it is rot-proof and cannot crack. Made 36 and 40—42 inches wide.

Oiled Calico. Calico treated with boiled oil, and thus rendered waterproof.

Oiled Silk is supplied (*a*) green, (*b*) in the non-adhesive form of yellow colour, and (*c*) a further variety is brown in colour.

Oiled Silk, Dextrinized, is prepared from the best English Oiled Silk by treating the latter with a solution of Carbolized Dextrin.

Oiled Silk Protective. This consists of oiled silk coated on both sides with copal varnish, and when dry, brushed over with Dextrin 1, Starch 2, Carbolic Lotion (1 in 20) 16.

Pessaries are ball shape, butterfly, circular, oval, cradle, and ring form.

India Rubber Plasters are made 7 inches wide and in Tape form.

Stomach Tubes.—That known as Van Valsh's, with bevelled 'Velvet Eyes,' is considered one of the best, but the bevelling may have the disadvantage of weakening the tube on one side and causing it to turn round when an obstruction is met. For passing the tube a special Lubricant Glycerin Jelly is supplied in Collapsubes, or a Glyco-Gelatin Pastil of Menthol $\frac{1}{12}$, and Cocaine $\frac{1}{20}$, is useful. (*Vide* Examination of Stomach Contents.)

Sutures (*vide* Ligatures).

CAPSICI FRUCTUS (*B.P.* '14). U.S.

Dose.—$\frac{1}{2}$ to 1 grain (0·03 to 0·06 Gm.), in a pill.

The dried ripe fruit of *Capsicum minimum, C. fastigiatum* (*Solanaceæ*), Cayenne pepper, is from Nepaul.

Contains as chief constituent Capsaicin—formula variously stated.

Capsicin.

Dose.—$\frac{1}{20}$ to $\frac{1}{10}$ grain (0·003 to 0·006 Gm.).

Made by extraction with 90% Spirit. It is a dull reddish brown oily mass becoming crystalline.

Gerrard found that Alcohol 90% is a good menstruum for extraction. He prepared a 2 in 1 liquid extract, and from this an ointment 1 in 10 with the official basis or hydrous lanolin, also a plaster 10%.

Oleo-Resina Capsici, U.S.

A bright red oil obtained by exhausting with ether, distilling off the greater portion of it; allowing the remainder to evaporate spontaneously in a warm place. Pour off the liquid portion, transfer the residue to a glass funnel, with a plug of cotton wool, and, when the fatty matter (to be rejected) has been completely drained, mix the liquid portions.

1½ of acetone will exhaust (if percolated slowly) 1 of capsicum. Yield of oleo-resin 5 to 16%.—Caspari.

The name Capsicin is not synonymous with the Oleo-Resin.

The word "***Oleoresin***" properly applies to the *ether or acetone extractive.* A weighted quantity is dissolved by solution of soda filtered through calico, the solution is then acidified and extracted by ether. The dried ether extract is then treated with 60 per cent. spirit. To prevent any oily acid from passing through the filter, stir with calcium sulphate or the like before filtering. The spirit solution is evaporated and the dried extract weighed. A sample of a preparation made with 60% Alcohol gave 10·66 per cent., while one of the true oleoresin gave 18·82 per cent.—D. B. Dott, P.J. i./22,64, C.D., 1922, 117.

Pilula Capsici Composita.

Capsicum Oleo-resin ½ minim, Clove Oil ½ minim, Calomel 1 grain, Aloes 2 grains. For the atonic stomach of drunkards.—H.

Ⓟ **Emplastrum Capsici.** (Ⓟ *cf.* Emp. Plumbi).

Evaporate the Alcohol from Liquid Extract of Capsicum 10, and stir into Resin Plaster 95. Contains 5% of Solid Extract (Gerrard). U.S. has Oleo-Resin of Capsicum 0·25 Gm. brushed over 15 square Cm. of adhesive plaster.

Capsicum plasters in rubber combination are also made in sheets 7 in. by 5 in., and yard rolls 7 in. wide.

Emplastrum Capsici Mite (Mild for dental use) R.D.H.

Caoutchouc 10, Yellow Paraffin 1. Heat carefully so as to just liquefy, and add Resin 10, Powdered Orris Root 4, Finely Powdered Capsicum 4. Mix and spread on linen and cut into pieces half the size of finger nail. Dry the gum thoroughly before application.

Emplastrum Capsici Forte, R.D.H.

Prepare as above, omitting the powdered Capsicum.

Spread and brush the surface thinly with Oleo-Resin of Capsicum *q.s.* (Neither of these plasters contains lead.)

Fluidextractum Capsici.

Dose.—1 minim (0·06 Cc.) Alcoholic Percolate 1=1. Gerrard advised the following formula:—

Exhaust Capsicum 100 in fine powder (No. 60) by percolating with 90% Alcohol, distil off alcohol until the residual extract weighs 50,1 of extract=2 of drug, *i.e.*, double the strength of the U.S. VIII. preparation.

Unguentum Oleo-Resinæ Capsici.

Oleo-resin of Capsicum 1, Hard Paraffin Wax 1, White Soft Paraffin 8. Melt the paraffins, add the oleo-resin, and stir until cold. For use as the liniment.—P.J. ii./11,630. May be too strong for tender skins—will bear dilution 2 or 3 times.

Tinctura Capsici (*B.P.* '14). 1 in 20 of 60% alcohol. U.S. X. 1 in a mixture of Alcohol (94·9% vol.) 95 and Water 5, *q.s.* to 10.

Dose.—5 to 15 minims (0·3 to 1 Cc.).

Given internally it increases the flow of saliva and gastric juice. It also increases the peristalsis of the intestine, relieves atonic dyspepsia, and is useful in dipsomania—it allays the craving for alcohol. *cf.*

Mistura Capsici Sedativa, *infra*. The *B.P.* '14 tincture is too weak for external use as a rubefacient.

FILARIASIS is treated prophylactically by Pepper and Capsicum. Tincture of Capsicum found useful in acute filarial fever and lymphangitis.—J. A. Robertson, L. ii./15,673.

Tinctura Capsici Ætherea.

Prepared as *B.P.* '14 tincture, with pure ether *vice* alcohol.

Tinctura Capsici Fortior, B.P.C.

Dose.—1 to 3 minims (**0.06 to 0.2 Cc.**). Principally used externally. *Is practically identical with Concentrated Tincture of Capsicum* (Turnbull).

Capsicum in No. 80 powder 1, Alcohol (90%) *q.s.* to 3. Is useful for chilblains but only when the skin is not broken.

This is too irritating generally. The writer's formula is:—

Linimentum Capsici.—*Martindale.*

Capsicum Fruit in No. 80 powder 10, percolate with Alcohol (90%) to 70, and add Oleic Acid 10, Oil of Lavender ½. Painted on the skin, or applied sprinkled on piline or flannel, in an hour it produces a red glow; its action may be arrested by smearing the part with vaseline. Useful in chest affections, rheumatism, sciatica, &c. Does not redden the skin for any length of time, hence may be used on exposed parts.

Linimentum Capsici Duplex is the latter, double strength.

Mistura Capsici Sedativa (anti-alcoholic).—L.H.

Dose.—½ ounce (**15 Cc.**) containing Capsicum Tincture 5 minims, Tincture of Ginger 20 minims, Potassium Bromide and Sodium Bicarbonate each 10 grains, Infusion of Quassia to ½ ounce.

Unguentum Capsici (*B.P.* '14). Capsicum Fruit bruised 25% in a basis of soft and hard paraffin and prepared lard, strained after digesting an hour on the water bath.

Resembles Smedley's Chillie Paste.

The following formula (Gerrard's) is not wasteful of the fats:—

Liquid Extract of Capsicum (1=2 of drug, Gerrard) 60 grains, Olive Oil 1 ounce, Spermaceti 60 grains, melt the fats and stir in the liquid extract. A more absorbent ointment would be liquid Extract of Capsicum 60 grains, Hydrous Lanolin 1 ounce 60 grains.

Capsicum Wool, CALORIFIC WOOL.—Oleo-resin of Capsicum 1, Ether 30, Absorbent Cotton 19. Dissolve the oleo-resin in the ether, saturate the wool evenly with the solution and dry.

Alternative formula (Gerrard):—

Dissolve liquid extract of capsicum (Gerrard) 2 ounces in alcohol 90% 7 ounces. Pour the solution on to the cotton wool 9 ounces under pressure to saturate evenly. Dry and preserve in well closed cartons. Contains 10% extract. Colour with eosin, as otherwise the colour fades. Cover with oiled silk when applying to increase activity.

L. H. directs to make a tincture by percolating Capsicum 2 ounces with Alcohol 70% 10 ounces, and to then impregnate Cotton Wool 16 ounces with this, express and dry.

✱**Capsogen** (T.M. 327250) is a trade variety of the above encased in gauze

Capsicum Gamgee Tissue is also made.

All the above are very useful in rheumatic affections, bronchial and similar painful complaints where warmth relieves.

CARBONIS TETRACHLORIDUM. PH. NED. V.

Syn. ∗TETRAFORM (T.M. 445574). $C.Cl_4$ = 153·828.

Dose.—The general conclusion is that **3 Cc.** (45 minims) (in several capsules) is adequate, but **6 Cc.** doses have been taken by an adult. 10 to 20 minims is safe for children of 3 to 4 years. Children of 1 year can have 10 minims; a child of 10 should receive 30 minims; a youth of 16, 40 minims (2½ **Cc.**), and so on even when seriously ill from various causes.

A heavy, volatile, and mobile chloroform-like liquid, has a pleasant pungent, quince-like odour if pure. Sp. Gr. 1·56. B.Pt. 77 to 78° C.

Uses.—It has been extensively used in ***Ankylostomiasis,*** *Syn.* Uncinariasis, Dochmiasis, Hookworm infection.

The vapour inhaled relieves hay fever. Employed locally, sprinkled on piline or lint covered with American oiled cloth, it quickly relieves neuralgic pains. Has been used as, but is not a successful anæsthetic (proportion of deaths stated to be 1 in 20,000 —B.M.J. ii./09,243). Deaths have been caused by its use as a dry shampoo by hairdressers.—Details in Edn. XVI., p. 810.

REFERENCES TO ANKYLOSTOMIASIS, ETC.

It aids expulsion of ascaris lumbricoides if followed by purgative, but is not as effective as Chenopodium Oil in killing this. It is not necessary to precede or follow administration by a purge.—L. Nicholls and G. G. Hampton, B.M.J. ii./22,8.

Effective in animals. M. C. Hall swallowed 3 Cc. in hard gelatin capsules without untoward effect.—L. i./22,391,1057. 10 Cc. doses considered a maximum—given to prisoners and tolerated.—P.J. ii./22,295. 10 Cc. doses, in hookworm disease, produced no ill effects. 12 Cc. removed all hookworms and ascarides.—C. N. Leach, per Jl. Trop. Med., Aug. 15/22,264.

It also expelled *oxyuris vermicularis* and some *trichuris trichiuria* and *ascaris lumbricoides.* It acts as a moderate purge, so it is not necessary to prepare the patient as for thymol. It may be combined with Oil of Chenopodium for ascaris.—J. G. Reed, B.M.J. i./23,1048.

Larger doses than 3 Cc. unnecessary and possibly dangerous. Wide variations in individual reaction to drug; 20 Cc. have been given. Alcoholic especially susceptible, 1·5 Cc. having produced toxic symptoms in an acut alcoholic.—W. G. Smillie and S. B. Pessoa, per Jl. Trop. Med., April 16/23,127.

Of little value against Ascaris, Trichiuris or Hymenolepis nana. It is a soporific and is well tolerated by children.—J. Borland McVail, Ind. Med Gaz., Aug. '22, per Jl. Trop. Med., Oct. 16/22,336. Doubtful whether it is an actual anthelmintic. It has soporific action on hookworm patients.—T. A. Henry, P.J. i./23,28.

Hookworm in Filipinos. Approximately 50% of the adults found to b infested with hookworm.—B. Schwartz and M. A. Tubangui, per Jl. Trop Med., May 1/23,143.

Report from Fort Benning Hospital, Ga. Very few symptoms followin administration. Vastly superior to Oil of Chenopodium or Thymol. Owin to the success of the experiment—100% cures—the writers contemplat making it the routine treatment.—A. T. Cooper and A. J. Vadala, Jl. Trop Med., April 16/23,130.

One treatment administered to each individual in a given area lowere original hookworm infection of 100% to less than 9%. In Fiji 27,000 peopl treated without a casualty.—S. M. Lambert, per Jl. Trop. Med., Mar. 15/2 92; Col. Rep., Aug. 15/23,61.

Action on the liver.—Inadvisable to prescribe 5 Cc. doses, as an anthelminti with purgation, let alone without it. 3 Cc., however, appears safe. It i specific for ankylostomes, and is fairly efficient for *ascaris lumbricoides* an *oxyuris vermicularis*, but of little value in the elimination of *trichuris trichiura*.—J. F. Docherty and E. Burgess, B.M.J. ii./22,907.

Discipline worth more than treatment of cases. Surface infection of the soil is only one phase in the free life of the hookworm. The hookworm larvæ spend a considerable part of their life in the soil at various levels. Eggs may hatch out in a few days and the larvæ start then to migrate. Investigation proceeding. Work in U.S.A., and in Great Britain.—L. i./23,604.

Moderate alcoholism is not a contraindication, providing liquor is withheld two or three days before and after treatment. Saline purgatives should not be given immediately before treatment. The drug should never be given during the course of an infectious disease. In surgical cases where it is desired to rid patient of hookworm the drug should be given several days before the use of an anæsthetic.—C. N. Leach and Co-workers, per Jl. Trop. Med., Feb. 15/23,47.

Given in Travancore, to several thousand coolies every month—the dose being 2 minims for each year of age, with a maximum of 45 minims, floated on 2 ounces of water; no complaints.—J. H. Moore, Travancore, Feb., 1925.

Follow with a saline purge. Unsuited for weak individuals and those with liver derangement. Fats and Alcohol should be avoided and a diet rich in carbohydrates and poor in fats is indicated. Can be given in kala-azar and malaria during remissions of fever, and is safe for pregnant women. Superior to Chenopodium for Necators and on a par in removing Ankylostomes. With Chenopodium has a distinct ascaricidal action and orally has more action on Oxyuris than any other anthelmintic. Promising also by rectal injection in warm milk. Little action against Trichuris, Strongyloides, or tapeworms.—A. C. Chandler and A. K. Mukerji, I.M.G., Feb. '25,68.

Good results in Egypt.—per Jl. Trop. Med., July 15, '25,268.

The **addition of Chenopodium** of no value in pure Necator infections, but the combination is more powerful on Ankylostomes than either drug alone. A dosage of 60 m. of Carbon Tetrachloride in milk and 15 m. Oil of Chenopodium in a capsule is safe for controlled patients.—A. C. Chandler and A. K. Mukerji, I.M.G., April, '25,147.

More than 225,000 persons treated in Siam since May, 1923, with a mixture of Chenopodium (40%) and Carbon Tetrachloride (60%). Maximum dose 2 Cc. Three deaths reported.—Jl. Am. Pub. Health, per Jl. A.M.A. ii./25,1001.

Approaching the ideal for field treatment of hookworm is 2 Cc. of a mixture of 4 parts Carbon Tetrachloride and 1 part Ascaridol, as former is selective on female hookworms, but does not remove ascarides, while latter is selective on male hookworms and is efficient in removing ascarides.—per Jl. Trop. Med., Oct. 1, '25,354.

A mixture of Carbon Tetrachloride 2 and Chenopodium Oil 1, given to children, 0·1 Cc. for every year of age up to a maximum of 1·5 Cc.—Col. Med. Report, No. 207, p. 33, per Jl. Trop. Med., May 2/27.

From the aspect of safety first, Carbon Tetrachloride does *not* occupy the position claimed. Thymol and Chenopodium Oil, 4 Gm. and 1·2 Cc. respectively, are safe, the latter being more effective against *A. duodenale*. Medicinal Iron not recommended in the persistent presence of hookworms. After expulsion of the worms Arsenic may aid the bone marrow in formation of hæmoglobin. A drug specific in its toxicity to hookworms has yet to be found.—Lt.-Col. C. Lane, L. ii./26,346.

Tetrachlorethylene and Carvacrol (*q.v.*) have been tried in hookworm.

DISTOMIASIS OF SHEEP.—Carbon Tetrachloride 1 Cc. in capsule, without previous starvation is generally sufficient to clear adult flukes from the bile ducts. Some flocks tolerate the drug badly and it is best to try it on a few sheep first.—L. ii./27,128. From *personal* knowledge this dose is harmful and not efficacious: on the other hand a much smaller dose—*e.g.*, 0·3 Cc. combined with 0·3 Gm. crude Filicin in 0·4 Cc. Vegetable Oil is certainly effective.—W.H.M., March, 1928.

Carbon Tetrachloride poisoning.—There is individual variation in reaction to the drug. The report on two fatal cases shows it may cause necrosis of the liver and of the suprarenal cells (as demonstrated in guinea-pigs). Effects similar to those of Chloroform poisoning. That poisoning may be due to Carbon Bisulphide, has been disproved, as pure samples may be toxic, provided the drug finds a pathway for distribution in the organism as is provided by alcohol and fats; milk also is a doubtful vehicle. An effective remedy, but requires further study.—per Trans. Roy. Soc. Med., Vol. 18 No. 1, May '24, p. 73.

Apart from local irritant effects, such as bronchitis following inhalation poisoning consists in liver damage, the first indications being abnormal amount of Bilirubin in the blood. Given intravenously to dogs it is lethal in dose of 0·154 Cc. per Kg. body weight.—Jl. Pharm. & Exper. Ther., '23,22,215 per J.C.S., A. i./24,245.

Harmless, although containing Carbon Di-sulphide, whereas poisoning ha been reported with the U.S.P. product. Two healthy Javanese women die from 2 Cc. Liver degeneration is regularly seen, although recovery is apparen some time after use.—Y.B.P., '27,270.

A case of Carbon Tetrachloride poisoning due to bursting of a patent fir extinguisher.—L. A. Dingley, L. i./26,1037.

Toxicity of Carbon Tetrachloride.—Impurities probably Sulphur compounds Fractionation and rejection of the first 1% desirable.—M. Khalil, L. i./26,547

Should not contain more than ***5 parts per million of Carbon Bisulphide,*** should be free from acidity, chlorides, free chlorine, organi matter, and aldehydes.—M. Perkins, P.J. ii./24,101. *See also* H. H. Dale —Pres., Sept. '24,323.

Absorption and Excretion of Carbon Tetrachloride.

The livers of dogs receiving 3 Cc. by the mouth were badly damaged. Following absorption by the intestine it is rapidly excreted in the expired air Since the danger is greatest during the first few minutes after reaching th duodenum, give a saline purge *immediately*, rather than delay removing th remainder of the drug for several hours.—H. S. Wells, Jl. Pharm. & Exp Ther., '25,235.

Prolonged dosage of dogs in both large and small amounts, produced cirrhosis —P. D. Lamson and R. Wing, Jl. Ph. & Exp. Ther., Oct. '26,202.

Dry Cleaning.—Being non-inflammable, the solvent is useful. When added to Benzine for safety it should constitute at least 70% of the mixture. Fo glove cleaning it leaves the leather less likely to crack.

Certain oleo-resins may be made by Carbon Tetrachloride extraction but it has no great advantage except non-inflammability. It is not suite for alkaloidal drugs. It gives colour reactions with the *o-* and *m-* but no the *p-* substituted phenols.—G. E. Trease and H. Tingey, P.J. ii./26,150.

Iodised Carbon Tetrachloride.—Two cases of lupus erythematosus an one of tuberculous lupus treated by local use of Carbon Tetrachloride an the same Iodised (3% is mentioned). Applied on cotton wool alternately and in addition Iodine internally. Fistulas were washed out with 1 to 5 C of the preparations. In a case with great œdema 1 to 2 Cc. of the Iodise preparation was injected under the skin.—Goubeau, Cong. Derm. and Syph Strasbourg, 1923.

CASCARA SAGRADA (*B.P.* '14). **U.S.,**

P.G. V. (not in P.G. VI.), etc.

Syn.—SACRED BARK.

The dried bark of *Rhamnus purshiana* (*Rhamnaceæ*).

Dose.—3 to 15 grains (**0.2 to 1 Gm.**) in cachets.

The active constituents of Cascara cannot be defined. In Vol. I we provide some data. *B.P.* '14 and **U.S. X.** require the bark t be kept one year.

Cascara Sagrada occurs extensively in British Columbia, the onl British Colony in which it grows wild.—P.J. i./23,314. For not on cultivation and substitution, *see* Vol. II.

Flavoring.—See Extractum Cascara Liquidum.

Uses.—A vegetable bitter, increases peristalsis, empties rectum it is useful for internal piles, and is a good laxative in habitu constipation. For dosage see Liquid Extract.

Cascara Capsules (**'mild'**) represent half a drachm of Liquid, or about 6 grains of Solid Extract. Capsules (**'strong'**) of **double this strength** are also prepared.

Dose.—1, 2, or more. The mild are also prepared with 1 grain **Euonymin** in each in addition. *Dose,* 1 or 2 at bedtime.

Cascara Jelly.

Dose.—1 to 4 drachms, equivalent to Cascara Extract ½ to 2 grains. For habitual constipation. The agar-agar basis renders the fæces more voluminous and hydrous. The preparation is agreeably flavoured.

Cascagar.—*Martindale.*

Dose.—1 teaspoonful up to 2 tablespoonsful to be taken with stewed apple or other moist food.

A preparation of flaked Agar with Cascara Extract flavored with Lemon, also with Raspberry, acting similarly to the preceding.

Syrupus Cascara Aromaticus (*B.P.* '14). *Syn.* **Elixir of Cascara B.P.C., 1894.**

Agreeably flavoured with Orange and Cinnamon.

Contains 40% of Liquid Extract of Cascara.

Dose.—½ to 2 drachms (**2 to 8 Cc.**). Very small doses three times a day are pleasantly laxative.

Extractum Cascara Sagrada Siccum (*B.P.* '14).

Dose.—2 to 8 grains (**0·12 to 0·5 Gm.**) in pill.—An aqueous extract (*Cascara Sagrada* is indeclinable, being Spanish and not Latin).

U.S. X. 1=3 by extraction with boiling water, and adjusting with starch. Fr. Cx. extracts with 60% alcohol.

Experiments in moisture absorption.—F. Wokes, P.J. ii./26,187.

Extractum Cascara Sagrada Liquidum (*B.P.* '14).

Dose.—30 to 60 minims (**2 to 4 Cc.**).

An aqueous extract containing 25% of alcohol (90%) *i.e.*, the spirit strength was increased from the '98 B.P. It may be made miscible with water by the addition of half its volume of sal volatile.

110 minims on evaporation on a water bath for 4 hours should yield not less than 20 grains of residue.

P. Belg. is similar. **P. Jap.** makes with Alcohol 90% and Water equal parts. **Fr. Cx.** Nouv. Supp. 1926, with Alcohol 50% 1=1 by weight using 8% of Light Calcined Magnesia in the extraction. **Fluidextract U.S. X.** 1 = 1 by percolation with hot water, evaporating and adding 25% of alcohol (95% vol.).

The following formula has been suggested (*cf.* Glycetracts):—

Moisten Cascara 20 ounces with Water 15 ounces, and set aside 6 hours, pack loosely in percolator and percolate with more water to exhaustion. Evaporate, percolate to 12 ounces, cool and add Glycerin 8 ounces, allow to stand, filter and add to the filtrate Strong Solution of Ammonia 80 minims. Without the Ammonia the preparation became turbid. The Glycerin re-dissolves some of the matter thrown out on heating, hence probably the supposed increased laxative action of a Glycerin Extract. The Glycerin Solution above mentioned **filters easily.—J. H. Franklin.**

Use in Constipation.—

It is best to take advantage of its tonic properties and avoid its purgative action. The initial dose depends on the individual, but it must be correctly

found—15 to 20 drops *t.d.*, suffices for the adult. The object is to procure one motion only a day. The dose that is sufficient must be taken in a wineglassful of water thrice daily after meals for a week or ten days, or until the action becomes somewhat too pronounced. Then reduce dose by one drop only and take with same regularity as before. In time it will be found that 1 drop in water thrice daily after meals will be sufficient. Finally the medicine may be omitted altogether.

Constipation in a child will often be relieved by one to three drops in a drachm of syrup one to three times a day.—Gordon Sharp, Pr. Mar., 1913.

Flavoring.—Syl Lavandulæ, Syl Vanillæ, Extractum Glycyrrhizæ Liquidum, *v.* also Syrupus Cascara Aromaticus.

Orange, Coriander, Anise, Cassia and Liquorice all mask the unpleasant taste of Cascara.

'Bitter-free Cascara'—*Martindale.*

Dose.—¼ to ½ drachm increased.

A new preparation, the result of experiments during 1927, designed to supply the tonic laxative properties of the bark while omitting the substances with griping effect. It is not made by means of Magnesia.

Fluidextractum Cascaræ Sagradæ Aromaticum, U.S.X.—*Average dose.*— 30 minims (2 Cc.) 1=1. Made by percolating the drug mixed with magnesia and slaked lime with boiling water, evaporating and adding several flavoring agents. Sometimes called 'Aromatic Cascara' in the States.

Extractum Cascara Aromaticum Liquidum.—*Cowley.*

Dose.—30 to 60 minims (2 to 4 Cc.).

Cascara Sagrada (No. 20 powder), 20 ounces, Diluted Sulphuric Acid, 1 ounce, Alcohol (90%), 4 ounces, Oil of Coriander and Oil of Orange, of each 20 minims, Spirit of Chloroform, 80 minims, Gluside (soluble), 13 grains, Liquid Extract of Liquorice, 4 ounces, Solution of Ammonia and Distilled Water, *aa. q.s.* to 20.

Boil the cascara with 7½ pints of distilled water and the diluted sulphuric acid for two hours; allow the mixture to stand 24 hours, then pack in a percolator and exhaust with distilled water. Neutralise the percolate with ammonia, and evaporate on a water bath to 12 ounces, maintaining slight alkalinity throughout the operation by the further addition of ammonia from time to time. Dissolve the oils and gluside in the alcohol, and add the spirit of chloroform and the liquid extract of liquorice. Mix this with the concentrated percolate, and if necessary make up to 20 ounces with distilled water

✱ **Kasak** (T.M. 67927, 67928, 90413).—*Dose* for children, 1 or 2 drachms; adults, ½ ounce. A laxative free from bitterness.

Kasena.—*Dose* as last, is the same with Senna. **Kasena Capsules** are also made.

Mistura Cascara. Gt. Orm. H.

Liquid Extract of Cascara, Liquid Extract of Liquorice, Syrup of Orange Peel, Chloroform Water, of each 15 minims for one dose.

Ⓟ **Mistura Cascara Sagrada Compositus,** Vic. Park.

Dose.—½ to 1 ounce.

Liquid Extract of Cascara 1 drachm, Hyoscyamus Tincture ½ drachm, Tincture of Nux Vomica 10 minims, Aromatic Spirit of Ammonia 1 drachm, Magnesium Sulphate 1 drachm, Syrup of Ginger 1 drachm, Water to 1 ounce.

Mistura Hepatica. *Dose.*—1 to 2 drachms in water. Liquid Extract of Cascara 20, Tincture of Jalap 20, Tincture of Podophyllum 10, Compound Tincture of Gentian 10, Chloroform Water 50, Sal Volatile 10.

Pastils of Cascara each contain 2½ grains of Extract, and are coated with Tolu. *Dose.*—1 or 2.

ⓟ Pilula Cascara Composita.

Extract of Cascara 1½, Extract of Nux Vomica, Dry Extract of Belladonna, of each ⅛, Milk Sugar 1. In grains for one pill, or in grammes for fifteen, each pill weighing 3¼ grains.

Dose.—One before dinner or at bed-time.

An agreeable and efficient aperient, with gentle action continuing beyond the first day; good for liver inaction.

Cascara Extract Tablets, plain or sugar coated, 1, 2, 3, 4, and 5 grains. *Dose.*—1 or more according to strength.

Tinctura Cascara Sagrada.

Percolate 1 to 5 with Alcohol 60%.

Laxative dose.—10 to 60 minims (**0·6 to 4 Cc.**).

ⓟ Tinctura Laxativa.

Dose.—20 to 60 minims (**1·2 to 4 Cc.**).

Liquid Extract of Cascara Sagrada 2, Aromatic Spirit of Ammonia 2, Spirit of Chloroform 2, Tincture of Belladonna 1, Tincture of Nux Vomica 1. This is an agreeable and elegant form of administering Cascara, being miscible with water.

Trochisci Cascara Sagrada et Olei Menthæ Piperitæ.

These are made with fruit basis, contain 2½ grains of Extract flavoured with Peppermint, and are useful correctives. *Dose.*—1 or 2.

Vinum Cascara.—*Martindale.*

Dose.—½ to 1 ounce (**15 to 30 Cc.**).

Liquid Extract of Cascara 1, Sugar 1, Aromatic Elixir 1, Sherry to 20. Mix and decant from any sediment which may form on standing.

Dioxyanthraquinone. *Syn.* ✱ISTIZIN (T.M. 338008).

$HO.C_6H_3CO.CO.C_6H_3.OH = 242{\cdot}064$. P.G. VI.

Dose.—2 to 6 grains (**0·12 to 0·4 Gm.**).

Orange crystalline powder, slightly soluble in water. M.Pt. 190 to 192° C. A synthetic purgative. *Tablets* contain 0·15 Gm.

✱Isacen (T.M. 451886). *Syn.* DIACETYL-DIHYDROXYPHENYL-ISATINE.

Dose.—2 to 4 granules, each 1/12 grain (**0·005 Gm.**).

A synthetic purgative, which in small doses stimulates peristalsis by action upon the mucous lining of the colon and large intestine. It passes through the stomach unchanged and has no action upon the kidneys.

CEREVISIÆ FERMENTUM.

Syn. FÆX MEDICINALIS. *Dose.*—½ to 1 ounce (**15 to 30 Gm.**).

The cells and spores of *Saccharomyces Cerevisiæ.*

All fermentations produced by living organisms (as in the case of yeast fermentation of sugar) are caused by definite chemical substances—ferments—produced in the cells of the organism. The ferment from the yeast cell was extracted in 1897 by precipitating yeast juice with Acetone, centrifugalising and washing the sediment with Ether and Acetone, and drying over Sulphuric Acid.

The phenomenon of Alcoholic fermentation, according to Harden, 'is one in which an enzyme and a co-enzyme, a second enzyme-hexose-phosphatase, and in addition sugar, phosphate and the hexose-phosphate formed from these' are concerned.—B.M.J. ii./11,22.

The fermentation of sugar can be effected by finely divided metals, *e.g.*, platinum. This goes to show that enzymes are catalytic agents.

Fæxin. A dry powdered yeast. Pills and tablets are made *v. infra.*
Dose.—A teaspoonful with meals in water, beer, or milk.

Manufacture.
The Acetone method of drying consists in treating the yeast with repeated quantities of Acetone, pressing off and then treating with Ether and finally drying at not exceeding 45° C. Another method is to work in a partial vacuum over Sulphuric Acid at 42° C. (108° F.). Spread the Yeast in very thin layers.

Uses.—Internally both fresh yeast and the dried form are given to check boils and for acne. It is said that fresh yeast given *per os* grows actively in the stomach and slightly reduces sugar in diabetes. Yeast has been used for constipation, as also in tuberculous affections and in dysentery. In dyspepsia due to swallowing naso-pharyngeal pus, it acts gastrically, and probably by *direct* contact. It not only checks vomiting, but *after* 14 to 21 days use it will be noted that the patient loses the icteric complexion, and gets a healthy colour.

Some hold the action of Yeast is virtually that of Nuclein, as it is still effective after the yeast has been heated to 130° for an hour.

Glycogen 5% (equivalent to 25% of the dried material) is a constituent of yeast.—Pavy and Bywaters.

Burns have been treated by either fresh or dried yeast made into a paste with tepid boiled water on sterile gauze bandages.

For the peripheral neuritis of mediterranean fever, yeast has been recommended in doses of two drachms, twice daily. (*cf.* VITAMINS.)

Fæxin Extract. *Syn.* **Extractum Cerevisiæ Fermenti.**
By extracting fresh Yeast with Alcohol we obtain about 3% of oily extractive matter. This has been used for the various affections for which fresh and dried Yeast is employed, *e.g.*, in acne, erysipelas, furunculosis, folliculitis, leucorrhœa, diabetes, conjunctivitis phlyctenulosa, typhoid and acute articular rheumatism.

Fæxin Extract Pills, Stearettes and **Tablets** contain 3 grains (0·2 Gm.).

Extractum Fæcis, P.G. VI.
Prepared by first removing the bitter of fresh 'lower' beer Yeast with 1% Sodium Carbonate, and then submitting to a process of auto-digestion in the presence of Hydrochloric Acid, finally extracting the mass with water, evaporating and incorporating 25% of 'Medicinal Yeast' (entire Yeast with bitter removed) to produce the powder. The extract is used as pill excipient.

✱**Marmite** (T.M. 249997, 321670, 404589, Cl. 2), a palatable yeast extract, is rich in Vitamin B. It is stated to promote growth in weakly children, assimilation of fat, produces leucocytosis in chronic septic conditions and increases general metabolism.

Vitamins are absent from meat extract. Apart from this fact, there is no available information to show that meat extract is better or *vice versa.* —A. Chapman, P.J. i./19,115.

The preparation of Yeast Extract.—P.J., ii./27,482.

Nuclein.
Dose.—15 grains (1 Gm.) several times daily.

Tablets, 1 grain (0·06 Gm.).

Is considered to be a compound of Nucleinic Acid with Albuminates and Carbohydrates. It tends to stimulate formation of white blood corpuscles, and hence to act as a bactericide. Septicæmia has been treated with it. The following is generally used :—

Acidum Nucleinicum. *Syn.* NUCLEIC ACID.

White powder somewhat soluble in water in the presence of a sufficiency of Sodium Hydroxide or Potassium Acetate. Its solution is acid to litmus paper. Insoluble in Alcohol.

J. J. Blackie, in a note on Pharmaceutical nomenclature, supports our divisions of these compounds.—P.J. ii./21,543.

Commercial Nucleic Acid should contain not much less than 1 % Nitrogen and 9% organic Phosphorus on the dry material.—A. C. Chapman, Analyst, 1918, 43, 259; see also Y.B.P., 1919, 148.

Dose.—15 minims (**1 Cc.**) of a solution made with Alkali *q.s.*, *v. infra*, hypodermically. **Sterules, Hypodermic,** contain ¾ grain in 15 minims (**0·05 Gm. in 1 Cc.**). Much larger amounts have however been given, *vide infra*. *Per os* ½ to 2 grains.

*When **NUCLEINIC ACID** is **ordered for injection** give the equivalent in the form of* **Sodium Nucleinate,** *the Sodium Nucleinate being prepared from Nucleinic Acid and a sufficiency of Sodium Carbonate to make it neutral to litmus. The writer is in the habit of employing a 5% Sodium Nucleinate solution when a saturated solution of Nucleinic Acid is ordered for injection. Sodium Nucleinate solutions should be prepared with Normal Saline and a sufficiency of Phenol for preservative purposes.*

Uses.—In treatment of anæmia, scarlet fever and puerperal fever, also in tuberculosis. To increase leucocytosis, and also the resistance of the patient in typhoid.

Sodium Nucleinate Solution 2 Cc. containing 0·05 Gm. per Cc. intramuscularly increases leucocyte count; found of value in influenza.—J. Graham Willmore & F. M. Gardner-Medwin, L. i./22,116. See also Gardner-Medwin, B.M.J., July 12, 1924.

LOBAR PNEUMONIA.—Sodium Nucleinate, 0·1 Gm. intramuscularly, of value. It brings down the temperature within 48 hours—otherwise the dose is repeated. Sodium Bicarbonate also given by mouth in ½ drachm doses every 4 hours in severe cases when the urine contains Acetone.—B.M.J.E., i./27,64.

In lobar pneumonia of an asthenic type in which leucocytes do not rise in number as the disease advances.—J. D. Comrie, Pres., Nov. '27,390.

Sodium Cacodylate with Nucleinic Acid in Septicæmia, see p. 188.

Progressive paralysis treated by Sodium Nucleinate on the basis that leucocytosis should be the aim.—O. Fischer, L. ii./22,537.

***Phlogetan** (T. M. 424927). A nucleoprotein compound used by injection of a series of graded doses from 1·5 Cc. upwards in the treatment of general paralysis of the insane and tabes dorsalis.

The action appears to depend on the production of a local inflammation. Also advocated by the makers in angina and rhinitis.

Bismuthi Nucleinas. *Dose.*—20 (**1·2 Gm.**) to 40 grains (**2·5 Gm.**). Yellowish powder containing 50% Bi. Insoluble in water and in dilute acids, splits up in the intestines, hence used as astringent for chronic intestinal catarrh. Was used on children under 2 years of age, also in cases of tuberculous diarrhœa, with benefit.

***Nargol** (T.M. 228097), ***Mercurol** (T.M. 228096) and **Cuprol** are compounds of Nucleinic Acid with respectively Silver, Mercury and Copper. Cuprol and Nargol are of use in granular ophthalmia in the form of 5% instillations. Nargol is soluble in water 1 in 4. Contains about 10% Ag.

Nargentol is stated to be a silver nucleinate.

Ⓟ**CHLORAL HYDRAS** (*B.P.* '14). U.S. X, P.G. VI., Ph. Ned. V., P. Jap., P. Helv., $C.Cl_3.CH.(OH)_2 = 165{\cdot}395$.

Trichlorethylidene Glycol.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**) in aqueous solution, or in chloroform water well diluted. Fr. Cx. has *maximum single dose* 60 grains, during 24 hours, 180 grains approximately.

Manufacture.—This compound is obtained by the action of dry Chlorine upon Alcohol. Chloral-alcoholate, the principal product of the reaction, is then decomposed with Sulphuric Acid. Chloral thus produced is hydrated by bringing it in contact with the necessary quantity of water, warming to about 50° C., and allowing it to cool. A note on the procedure. —C.D. ii./14,336. It has M. Pt. 49–53° C.

Soluble 4 in 1 of water, 5 in 1 of alcohol, 2 in 1 glycerin, 2 in 1 of ether, and 1 in 3 of chloroform, likewise soluble in oils and fats.

Flavoring.—Glyl Rosæ, Glyl or Syl Amygdalæ Amaræ; Syrupus Aurantii Floris.

Antidotes to Chloral.—Keep patient awake, apply strong ammonia to nostrils. Stomach pump or emetics (zinc sulphate 20 grains), followed by amyl nitrite, coffee, electricity, oxygen, picrotoxin, or strychnine. For Antidotes to ***Chloral*** when in ***conjunction*** with ***Morphine,*** see **Antidotes to Poisons.**

It is useful as an antidote to poisoning by strychnine.

Incompatible with alkalis, ammonium salts, potassium iodide or permanagate, and with bromides in presence of alcohol,—chloral-alcoholate may separate; also, with Magnesia, Chloroform and Magnesium formate may be produced. Liquefies with camphor, *q.v.*

Uses.—As a hypnotic, it is often combined with opiates, morphine or bromides, but it is incompatible with quinine. Its use is contraindicated in heart affections, Bright's disease, and when the vital force is very weak. Its sedative action resembles that of chloroform.

CHOREA has been treated by inducing prolonged sleep with its aid. It is given in tetanus. In epilepsy small doses may be efficacious.

In ASTHMA Chloral Hydrate 30-—40 grains is often useful.—Yeo.

In PUERPERAL ECLAMPSIA—control of fits by Chloral and Morphine regarded in France as almost specific—increasing dosage:—

1st hour, Morphine Hydrochloride ¼ grain hypodermically; 2nd hour, Chloral 30 grains, *per os* or *rectum*; 3rd hour, Morphine ¼ grain, hypodermically; 7th hour, Chloral 30 grains; 13th hour, Chloral 25 grains; 21st hour, Chloral 25 grains —B.M.J. ii./12,1128.

SEA-SICKNESS has been treated with drachm doses of a mixture of 2 drachms of Syrup of Chloral with 30 grains ammonium bromide, in water 1½ ounces.

INFLUENZA has been treated with 2% solution as gargle.

Ⓟ**Chloral Camphoratum,** B.P.C. (Pigmentum Chloral et Camphoræ, T.H.).

Chloral Hydrate 1, Flowers of Camphor 1. Sp. Gr. 1·223.

Combine in a warm mortar. It remains liquid at ordinary temperatures, and forms a valuable application painted on painful parts in neuralgia and rheumatism. It mixes freely in alcohol, ether, oils and fats, but the camphor is precipitated on adding to water or glycerin. Cocaine 10% or less may be incorporated.

The compound (chloral and camphor) dissolves the alkaloids atropine, morphine, and veratrine to the extent of 1 in 30 or more, but their salts are less soluble in it. Liquefactions of a similar kind take place on mixing and gently heating respectively chloral hydrate 1 with menthol 1, or phenol 3, or thymol 1. Quinine salts and chloral hydrate also form liquid combinations.

In FIBROSITIS the mixture of chloral hydrate, camphor and menthol is found to be satisfactory. Painted over the part, then gently rubbed in with the fingers.—A. P. Luff.

Ⓟ **Pigmentum Chloral Compositum**—W. H. has Chloral Hydrate 1, Menthol 1, Thymol 1, Camphor 3.

Ⓟ **Linimentum Chloral Compositum.**—R.D.H. is the same.

Ⓟ **Chloral Tannin Solution.**—*Syn.* CAPTOL.

Chloral Hydrate 1, Tannin 1, melt together on water-bath and dissolve in water, *q.s.* to produce 8. For strengthening the hair.

Ⓟ **Lotio Crinalis R.N.H.**

Chloral Hydrate 10 grains, Salicylic Acid 10 grains, Mercuric Chloride ¼ grain, Glycerin 20 minims, Acetone ½ ounce, Alcohol 90% to 1 ounce.

Ⓟ **Liquor Bromo-Chloral Compositus.** B.P.C., 1901.

Dose.—½ to 2 drachms (**2 to 8 Cc.**). 1 drachm contains nearly 10 grains each of Chloral Hydrate and Potassium Bromide.

Chloral Hydrate 1,600 grains, Tincture of Indian Hemp 400 minims, Tincture of Fresh Orange Peel 400 minims, Henbane Juice 1,600 minims, Syrup 3¾ ounces, Liquid Extract of Liquorice ½ ounce. Dissolve, add Potassium Bromide 1,600 grains dissolved in Distilled Water 7 ounces. Filter and add Distilled Water to 20 ounces.

Resembles the American hypnotic Ⓟ ***Bromidia (T.M. 45813),** which is stated to contain in each drachm Chloral Hydrate 15 grains, Potassium Bromide 15 grains, Extracts of Cannabis and of Hyoscyamus ⅕ grain each.

Dose.—½ to 1 drachm in syrup or water.

Ⓟ **Enema Chloral, L.H.** Chloral hydrate 10 to 40 grains, starch enema to 4 ounces.

Ⓟ **Suppository of Chloral.**

Chloral Hydrate 5, Oil of Theobroma 10. In grains, for one suppository, in grammes, for fifteen. Press into moulds. Heat must not be applied. It is useful in infantile convulsions, where nothing can be administered by the mouth. It should be forcibly retained for a few minutes with the finger, if necessary. It is locally irritating.

Sea-sickness has been treated by 20 grains per rectum.

Ⓟ **Syrupus Chloral** (*B.P.* '14). *Dose.*—½ to 2 drachms (**2 to 8 Cc.**).

Chloral Hydrate and Water *a.a.* 20% in Syrup.

Ⓟ **Tablets of Chloral,** 5 and 10 grains (**0·3 and 0·6 Gm.**) to *be dissolved—not swallowed whole, might blister. Dose.*—1 or more.

Chloralamide. *Syn.* **Chloral Formamidum** (*B.P.* '14).

$CCl_3CH(OH)NH.COH = 192{\cdot}411.$

Dose.—15 to 45 grains (**1 to 3 Gm.**) in weak spirituous or acidulated solution. *Max. single dose* 4 Gm. Max. in 24 hours 8 Gm.

PATENT: 7391/1899 ***Expired.*** TRADE MARK: A *device* with name and address, T.M. 95188/1890, is still on the Register.

In colourless inodorous shining crystals with a faintly bitter taste. Soluble about 1 in 20 of water, 1 in 2 of alcohol. Must not be heated over 55° C. It melts at 114–115° C. Incompatible with alkalis.

Manufacture.—By combining anhydrous Chloral 147 with Formamide 45 and recrystallising from Alcohol about 70%—care being taken, as above mentioned, not to heat above 55° C.

The toxicity of a brand of Chloralamide made by the author, August, 1916, was tested by a physiological expert and found to be less than that of Chloral Hydrate and not greater than that of the Chloral which it would yield on hydrolysis. It appeared therefore to be a safe hypnotic. The details showed that up to 70 mgr. per 100 Gm. of frog were tolerated in the case of Chloral Hydrate while up to 100 mgr. were tolerated in the case of Chloralamide.

Uses.—Hypnotic in insomnia of alcoholism, neuralgia, hysteria and cardiac diseases. Even 60 grain doses given.—B.M.J. i./09,555.

For insomnia and sea-sickness, Chloralamide and Potassium Bromide of each 15 grains, with Orange Tincture and Chloroform Water recommended. It acts if given as an enema.—*Hale White.*

Elixir Chloralamidi. *Dose.*—1 ounce **(30 Cc.)**=30 grains **(2 Gm.)**
Chloralamide 2 Gm., Alcohol 5 Cc., Aromatic Syrup 5·4 Cc., Glycerin 15 Cc., Water *q.s.* to 30 Cc.

Haustus Chloralamidi, G.H.
Chloralamide 30 grains, Mucilage of Tragacanth 1 drachm, Chloroform water to 1 ounce.

Tablets, 5 grains **(0·3 Gm.)**. *Dose.*—3 or more.

Chlorobrom. *Dose.*—½ to 1 ounce. A specialty said to contain 30 grains each of chloralamide and potassium bromide in an ounce, flavoured with liquorice, for insomnia and sea-sickness.

Haustus Chloralamidi Compositus, L.I.P.
Chloralamide, Potassium Bromide, of each 15 grains, Alcohol 90% 30 minims and Water to 1 ounce.

℗CHLOROFORMUM (*B.P.* '14). P.G.VI., U.S. X, P. JAP., P. HELV., FR. CX., PH. NED. V. $CHCl_3$=119·379.

℗*Chloroform and all preparations or admixtures containing more than 20% of Chloroform.*

Syn. TRICHLORO-METHANE; FORMYL TERCHLORIDE.

Dose.—1 to 5 minims **(0·06 to 0·3 Cc.)**, in mucilage and water, or in a perle; 3 drops=1 minim. Small doses may be given as chloroform water or spirit of chloroform. Very large amounts (up to 2 ounces) have been taken internally without causing death.

For Manufacture, History and Testing of Chloroform see Vol. II.

A little caustic lime added to a bottleful will neutralise any acid products that may form in it.

Pink Chloroform and **Green Ether** suggested to prevent accidents. —B.M.J. ii./14,241

℗**Acetone Chloroform** specially prepared for anæsthesia. Should be kept in amber-coloured, stoppered bottles or in the dark.

Chloroform has Sp. Gr 1·490 to 1·495 at 15·5° C. Boils at 60°—62° C. Miscible in all proportions with Alcohol, Ether and Oils. It may (*B.P.* '14) be made from **Alcohol, Industrial Methylated Spirit or Acetone. Sp. Gr. 1·483 to 1·487, and contains 2% Alcohol.**

Uses.—Inhaled, it is anæsthetic and analgesic. Internally is antispasmodic and sedative for asthma, colic, cough, and neuralgia.

In sea-sickness, one or two drops of Chloroform on a lump of sugar or in a wineglass of iced soda water, repeated every fifteen minutes, often give relief.

Externally in liniments to promote absorption and allay pain, as in neuralgia and sciatica. *See* General Preparations of Chloroform. 1 in 500 is a preservative of Infusions and Animal Extracts. It is a useful deodorant, *e.g.*, for the hands after post-mortem work.

Infection by intestinal parasites, *e.g.*, *Ankylostoma*, *Ascarides* and *Oxiurides* are well treated by doses *per os* of 3 to 4 Gm. mixed with Castor Oil or Olive Oil. It is a panacea also against all forms of external parasitic infection—*e.g.*, a 20 to 30% Chloroform in a fatty ointment base.—G. Alessandrini, L. ii./15,346.

Anaesthetic Uses and Preparations of Chloroform.

The **Vernon Harcourt Regulator** is used to permit of accurate dosimetry by the anæsthetist. The temperature of the Chloroform is mechanically adjusted to 16–18° C. and an admixture of Chloroform vapour 0.2% with air is used to begin with, afterwards increasing the Chloroform every half minute by 0.2% to a maximum of 2%. Narcosis is maintained by 0·5 to 1%.—B.M.J., July 18, 1903. Diagrams and further details are given in "Anæsthetics" by Dudley Buxton (H. K. Lewis).

Shipway's Apparatus (L. i./16 70). The most satisfactory way of giving Chloroform or Ether. Warmed mixture of air and anæsthetic vapour in operations for abdominal wounds in war. Patient recovers consciousness quickly and vomiting is rare.—C. Wallace and G. Marshall, L. i./17,640.

Administration of Chloroform either alone or with A.C.E. or Ether on the open Mask.

The following is "a rough sketch" of the usual procedure :—

"The patient who, according to instructions, has been breathing steadily and counting aloud, begins to waver and to make errors in enunciation and then, either with or without a stage of excitement, passes into complete anæsthesia. The pulse slows down, and becomes regular, the respirations become regular and blowing, the flaccid cheeks being puffed out with each respiratory effort; the whole muscular system becomes limp, and the pupils become moderately contracted and fixed. The chin must be maintained pulled up; respirations must always be audible, even loud; pulse must be frequently taken and pupils watched. These are the three indicators.

Pulse.—Pulse greatly accelerated generally means that the patient is coming out and is liable to be sick shortly. If pupils or conjunctival reflex confirm this, push the anæsthetic. Pulse becoming weak, irregular or slower, indicates a state of faintness,—remove mask. If collapse supervenes commence stimulatory measures,—the head to be lowered and body tilted up. Ether and Strychnine hypodermically; gag to be inserted. See that the pharynx is free from mucus by pulling tongue forward. Rectal injection of Brandy, cold water to face and ears; hot cloths over pericardium and (to the adult) artificial respiration. In the case of an infant or child the operator doubles a fist into the child's epigastrium to prevent distension of the stomach, covers child's mouth with a layer or two of gauze, and placing his mouth over the child's, blows the lungs up. The air is then expressed from the lungs and the procedure repeated several times.

Pupils.—"Pin point" pupils may either mean profound anæsthesia, in which case remove mask, or patient is coming out,—other evidence will indicate what should be done.

When the pupil becomes dilated remove mask, draw both upper eyelids back rapidly and simultaneously. If patient is coming round, response will be obtained,—push the anæsthetic. If no response, patient is in a state of collapse and requires stimulation.

Respiration.—Should the respiration tend to become too quiet, failure of respiration should be corrected,—this may be done by closing one of the nostrils with the finger,—this will have the effect of acting as a stimulus to deeper respiration. Keep lower jaw pushed forward and pharynx clear of mucus, also see that the tongue is well forward. The loop handle of a sponge holder, using the upper alveolar margin as fulcrum, is useful to bring tongue forward in the case of children. Vaseline should be smeared over the parts most likely to come in contact with the mask, thus preventing burning the patient's skin with the overflowing anæsthetic.

Combined Use of Chloroform and Oxygen.—This is conducted by passing the Oxygen through a wash-bottle containing the anæsthetic. The quantity of the Chloroform or Ether is, however, relatively small in comparison with the Oxygen passed through. Alternatively a funnel-shaped leather inhaler containing a piece of spongiopiline or felt is used. In the upper surface of the leather inhaler is a small metal tube for connecting with the Oxygen supply, thus a definite quantity of anæsthetic is given and the amount of Oxygen can be varied as desired.

Crile's Nasal Tube method of giving Chloroform (with a little Oxygen), preceded by Morphine and Atropine.—L. ii./09,364.

Antidotes for treatment if dangerous symptoms arise during inhalation of chloroform. (For Antidotes to ***chloroform swallowed*** *see* **Antidotes to Poisons.**) See that the airway is clear and the clothing loose. Place patient upon the floor with legs held up so that the abdomen is higher than the brain. Artificial respiration by tongue traction (*Pull out the tongue*) and Sylvester's or Schafer's method.—R.D.H.

Amyl Nitrite to the nostrils and inject hypodermically 1 drachm of ether or brandy or $\frac{1}{30}$ grain of **strychnine** or 1 Cc. of **Curschmann's Solution.** Hot flannels should be placed over the heart.

Caffeine hypodermically or **Brandy** per rectum.

Inversion of the body has frequently saved patient.

The fibrillation of the heart from which death under chloroform frequently arises can be remedied by **Atropine** subcutaneously.

Sodium Lactate Solution. Copious rectal injection has been recommended to restore alkalinity of the blood—assuming Acetone and Diacetic Acid are products of the effects.

Heart massage in Chloroform Syncope by the subdiaphragmatic route often induces recovery.

If ¼ grain of morphine be first injected hypodermically, less Chloroform is needed, the insensibility is more profound, and the danger attending its use is lessened.

The previous administration of Quinidine protects against Adrenalin Chloroform syncope and against the danger of heart failure under anæsthesia.—J. Pharm. Chim., '27,190, per P.J., ii./27,591.

The ***Dangerous Effects of*** Chloroform fall into four groups (1) depression of the respiratory centre (2) fall in blood pressure (3) late toxic effects (4) Chloroform syncope. The use of Chloroform is not justifiable (1) in cases of grave debility with low blood pressure, especially in cases of patients suffering from shock (2) in cases likely to develop acidosis, *e.g.* the diabetic, the sufferer from septic abdomen, and children (3) in a great many cases during the induction period. To continue to administer Chloroform to an excited and struggling patient cannot be made a safe proceeding and is unnecessary and unjustifiable.—A. Mills, L. i./26,1134–36.

The SICKNESS produced by Chloroform tends to be more severe when the anæsthesia has been prolonged. Chloroform acts as a depressant, but it also excites the secretion of glands, chiefly the sali vary glands. At the commencement saliva saturated with Chloroform is being swallowed in large quantities. Mucus is secreted copiously. The gastric glands are pouring out a strongly acid secretion. A powerful irritant is thus collecting in a comparatively empty stomach. A gastritis is set up. When the effect of the anæsthetic is passing off, the lowest functions, such as muscular tone, are the first to reappear, thus vomiting begins and is often prolonged. The gastritis adds to the severity and painful character of the retching. Patient's lips may be excoriated by the vomit.

Sodium Bicarbonate dissolved in hot water is given to neutralise acid, and dissolve mucus and dilute the irritant in the stomach.

Hot fomentations or poultices, with or without mustard or blisters, are efficient counter-irritants for the epigastrium. A dilute **Hydrocyanic acid, Bismuth, and Soda Mixture** acts well, and in some cases with a foul tongue, powders of Rhubarb, Bismuth and Soda are useful to cure gastritis. The distressing heartburn is thus relieved. Morphine increases the sickness, but sometimes gives rest. **Scopolamine and Morphine** is better.

After most abdominal operations flatulence is relieved by *Saline per rectum*—1 pint to 1 quart every four hours—leaving in a rectal tube for an hour or so between times. Rubbing the abdomen adds to the comfort of the patient, but more vigorous treatment may be required, such as Turpentine enemata. If the violent sickness still persists, Castor Oil or Magnesium Sulphate should be given by the mouth. If the bowels do not act in six hours an enema of soap and water will prove effectual. Enemata of brandy and water and sips of brandy may be needed.

In abdominal operations when the vomit is hæmorrhagic and resembles beef-tea dregs or coffee grounds, carry out the above treatment for flatulence, stimulate the patient, give copious draughts of hot soda solution. From whatever cause, there is a leak of blood into the stomach, this must also tend to increase sickness already present. By washing out the stomach one gets rid of blood which has already collected, but it goes on collecting. Follow this with 5 to 10 minims of Adrenalin Solution in a little water. Suprarenal thus used probably stimulates the muscles of the stomach walls, blanches the dilated capillaries, and sets up regular rhythmical contractions of the stomach, which cause its contents to follow their natural course and to flow on into the duodenum.—J. W. Keay. *Adrenalin must not however be injected into a patient under chloroform.*

Small doses of chloroform on a lump of sugar sucked when desire to vomit comes on give brilliant results. The idea was hit upon by analogy with the fact that confirmed 'Spreeërs' get best result for alcoholic vomiting with small doses of alcohol.

Bibliography of untoward results with chloroform, vide Vol. II.

Tracheal administration of anæsthetics (Chloroform) by means of an orotracheal catheter prevents the admission of blood to the air passages.—Wm. Hill, B.M.J. ii./13,745.

Eye troubles following anæsthesia. Acute conjunctivitis may be caused by vapour of Chloroform or Ether, and keratitis with subsequent corneal scarring may occur. Instillation of Castor Oil prior to anæsthesia, or irrigation with Boric Acid lotion afterwards, recommended as preventive measures. Keep lids carefully closed and avoid frequent examination.—J. Blomfield, Brit.Jl.Anæsth., Oct. '25,66, per Pres., April '26,142.

Carbon Di-oxide as an aid in general anæsthesia.—J. S. Lundy, Jl.A.M.A., ii./25,1953.

Alkalosis well treated by Ammonium Chloride per rectum, 3 drachms in 5 or 6 oz. water just before operation, and 10 oz. 15% Sodium Chloride intravenously as soon as patient is put under anæsthetic.—R. Chalmers, L. ii./26,1267.

Anæsthesia in relation to cardio-vascular affections.—F. W. Price, B.M.J., ii./26,879; J. Blomfield, *ibid.* 883.

The immediate risk is probably 10 times greater with Chloroform than with Ether.—J. Ross Mackenzie, L. i./27,165.

Infants and children take Chloroform well, but it should not be used in those with anæmia, sepsis or shock.—J. Ross Mackenzie, L. i./27,164.

The effect of Chloroform anæsthesia on blood, kidneys and liver of young children is very slight—with proper supervision, a good anæsthetic for children. —B.M.J.E. i./24,43.

As an anæsthetic in women at the menopause Chloroform should not be used.—J. H. Hannan, B.M.J. ii./27,15.

Ⓟ**A.C.E.** (Alcohol, Chloroform and Ether).

Absolute Alcohol, Sp. Gr. 0·795, 1; Chloroform, Sp. Gr. 1·495, 2; Purified Ether, Sp. Gr. 0·720, 3; Sp. Gr. about 1·002. The three ingredients are intended to evaporate uniformly.

A.C.E. is as effective as pure Chloroform, and a safer agent when deep and prolonged anæsthesia is to be produced, while at the same time it is sufficiently rapid in its operation to be convenient for general use, although it takes a longer time than Chloroform (10 to 15 minutes) to procure anæsthesia. It is of service in midwifery.

Ⓟ **C.E.,** *i.e.*, a mixture of chloroform 2 parts with ether 3 parts, is an even better anæsthetic mixture in some cases, *e.g.*, where the airway is encroached upon as in angina Ludovici, in thyroid enlargement, in sublingual abscess, etc.

This mixture in same proportions, using a Skinner's mask, employed in a variety of grave operations—panhysterectomies, removal of double pyosalpinx, difficult appendicectomies, excisions of rectum, &c. Time of induction of anæsthesia averaged about 8 minutes. Modifications of the proportions have been suggested from time to time.

Chloroform and Ether anæsthesia produces immediate and marked lowering of the blood *p*H, leading to a condition of uncompensated alkali deficit which may go on to profound acidosis (coma). Ether and Chloroform produce a decided hyperglycæmia during anæsthesia, and deep and prolonged anæsthesia by these agents readily leads to oliguria or anuria. Gas anæsthetics not subject to these disadvantages, but they increase hæmorrhage, especially oozing from raw surfaces. Ether and Chloroform have inhibiting effect on uterine contractions, while gas anæsthetics increase contractions and afford more definite and controllable pain-relief and oxygenation. Absence of general circulatory depression with gas anæsthetics.—F. H. McMechan, B.M.J., ii./26,1110.

Deaths under anæsthetics. Contra to the common opinion, the Registrar-General's report serves to dispel the idea that Chloroform is safe when diluted with Ether.—A. Goodman Levy, L. i./26,174.

Anaesthol. A mixture of Ether and Chloroform—in proportions determined by the anæsthetist—with 17% of Ethyl Chloride. Used by Gwathmey in adenoid and tonsil operations. Gas and oxygen are passed over the preparation for inducing anæsthesia and gas—oxygen—ether for maintaining.—J.A.M.A., N.Y.M.J. June 19, '20, p. 1065 per Pres., Feb. '21,36.

Tissues exposed to various concentrations of Ether and Chloroform. There was greater reversibility on low organisms, Yeasts and seeds and *Chlamydomonas*, with Ether than with Chloroform.—A. L. Fleming, B.M.J. ii./22,921.

General Preparations of Chloroform.

Aqua Chloroformi (*B.P.* '14) and P. Jap.—1 in 400 of water.

Dose.—½ to 2 ounces (**15 to 60 Cc.**).

Salts, like sodium sulphate, are apt to cause deposition of chloro form from aqueous solution.

Ⓟ **Chloroform Sterules** *for Inhalation.—Martindale.*

Encased in cotton wool and silk; contain 10 minims in each. Are convenient for use in asthma, &c.; may be fractured and used by the patient while in bed. In angina pectoris Chloroform inhalations —'so far from being unsafe in cardiac disease, are often of the greatest use and perfectly safe.' In croup, brief inhalation of Chloroform acts promptly.—Whitla. Yeo.

Sterules are also made containing 20, 30, and 60 minims—the last for obstetric purposes avoiding risk of overdose.

Ⓟ **Gelatin Capsules of Chloroform.** *Dose.*—One or **two.**

Contain each 5 minims; are for similar uses, but the chloroform is apt to volatilise; Perles 3 **minims.** Very useful in sea-sickness.

Ⓟ **Chloroform and Ethyl Iodide Sterules,** *v.* Ethyl Iodide.

Ⓟ **Chloroformum Camphoratum, B.P.C.**

Camphor 2, Chloroform 1.

Useful for toothache, applied on cotton wool.

Ⓟ **Chloroformum Mastiche.**

Mastiche 1, Chloroform *q.s.* to 2.

Ⓟ **Guttæ Chloroformi cum Menthol Compositæ.**—SELF-INFLATOR DROPS. Menthol 15 grains, Chloroform ½ ounce, Acetic Ether and Alcohol 90% of each 2 drachms.—*Dundas Grant.*

Directions.—2 or 3 drops to be placed upon the wool in the inflator on each occasion of use.

In cases of chronic tympanic and Eustachian catarrh; value depends to some extent upon the ease with which air containing a little chloroform vapour passes up the Eustachian tubes. Inflation with an **Eustachian Self-Inflator** is to be conducted as follows:—Drop the amount prescribed on to the wool in the mouth-piece of the inflator by means of a medicine dropper. With the glass mouthpiece held firmly between or against the lips (according to the form of the instrument) and the nosepiece tightly in the freer of the two nostrils, compress the other nostril to close it completely. **Draw a** breath (not through the instrument) and then blow **through the** mouth-piece so as to puff out the cheeks and 'crack the ears.' If vapour is too irritating blow through the instrument a few times before use. To concentrate the effect on the right ear close firmly with the finger the *left* ear and bend head sideways over the left shoulder—*vice versa* for the left ear.

The duration of treatment should be controlled by the prescriber.

For the **Medicated Politzer Apparatus** in which these drops may be used see Dundas Grant, Pr., June '25.

Ⓟ **Linimentum Chloroformi** (*B.P.* '14).

Chloroform 1, Liniment of Camphor 1.

Vaseline might with advantage replace the oil of the camphor liniment for this preparation. U.S. orders Chloroform 3, Soap Liniment 7.

D P1 **Liquor Chloromorphiæ, Chloromorphia Solution.** (*Miscible.*)

Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

Chloroform 150, Glycerin 400, Liquid Extract of Liquorice 100, Morphine Hydrochloride 10, Solution of Atropine Sulphate 20, Oil of Peppermint 2, Alcohol (90%) *q.s.* to 1000.

10 minim dose contains:—Chloroform $1\frac{1}{2}$ minims, Morphine Hydrochloride $\frac{1}{11}$ grain, Solution of Atropine Sulphate $\frac{1}{5}$ minim.

Dissolve the Morphine Hydrochloride in the Liquid Extract of Liquorice, Glycerin and Atropine Solution, previously mixed: in part of the Alcohol dissolve the Chloroform and Oil of Peppermint; mix with the morphine solution, and add Alcohol *q.s.* to 1,000.

A useful sedative, resembling the remedy Ⓟ **Chlorodyne,** (which is *not* within D.D.A.) in active constituents. For the latter see also Proprietary Medicines chapter Vol. II.

The name Chlorodyne should not be applied to any preparation containing more than 0·1% Morphine *c.f.*, p. 567.

D P1 **Capsules** (gelatin) containing 5 minims for use of travellers are convenient.

D P1 **Tinctura Chloroformi et Morphinæ Composita** (*B.P.* '14).

Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

Chloroform 75, Morphine Hydrochloride 10, Diluted Hydrocyanic Acid 50, Tincture of Capsicum 25, Tincture of Indian Hemp 100, Oil of Peppermint 2, Glycerin 250, Alcohol (90%) *q.s.* to 1000.

10 minim dose contains:—Chloroform $\frac{3}{4}$ minim, Morphine Hydrochloride $\frac{1}{11}$ grain, Dilute Hydrocyanic Acid $\frac{1}{2}$ minim, Tincture of Capsicum $\frac{1}{4}$ minim, Tincture of Indian Hemp 1 minim.

Mix. Contains approximately four times the proportion of morphine present in the preparation of B.P. 1885.

N.B.—Contains Hydrocyanic Acid which the Chloromorphia Solution does not.

Poisoning by 4 ounces of Chlorodyne, with recovery by use of Atropine, Strychnine, and stimulants is recorded.

P1 **Tinctura Chloroformi et Morphinæ B.P. '85** (*Not* within D.D.A.).

Dose.—5 to 10 minims.

10 minim dose contains Chloroform $\frac{1}{4}$ minim, Ether $\frac{1}{3}$ minim, Alcohol 90% $\frac{1}{4}$ minim, Morphine Hydrochloride $\frac{1}{48}$ grain, Dilute Hydrocyanic Acid $\frac{5}{8}$ minim, Peppermint Oil $\frac{1}{80}$ minim, Liquid Extract of Licorice $1\frac{1}{4}$ minim with Treacle and Syrup *q.s.*

Ferrocyanide colouration of Tinctura Chloroformi et Morphinæ, B.P. 1885. A sample of this gave, on dilution with water and acidifying with Hydrochloric Acid, a green colour. Possible formation of Ferrocyanide from the Hydrocyanic Acid, the iron being present in the treacle.—C. M. Caines, P.J. ii./22,89.

Spiritus Chloroformi (*B.P.* '14).—*Syn.* CHLORIC ETHER. 1 in 20 of alcohol (90%). U.S. has 3 in 50.

Dose.—30 to 40 minims (**2 to 2·5 Cc.**), or 5 to 20 minims (**0·3 to 1·2 Cc.**) repeated.

Tinctura Chloroformi Composita. B.P. 1885. Chloroform 2, Alcohol 90% 8, Compound Tincture of Cardamoms 10.
Dose.—5 to 60 minims.

Emulsio Chloroformi U.C.H.

Chloroform 5, Quillaia Tincture 2, Water to 100. St. Th. H. uses Senega Tincture one third the quantity approx. *vice* Quillaia. Employed to preserve vegetable preparations.

Ethylene $CH_2 : CH_2 = 28\cdot032$. *Syn.* Olefiant Gas.

The first known member of the Alkylene or Olefine series of hydrocarbons—*i.e.*, the series in which a double linkage occurs. Ethylene is a colourless gas with slight ethereal odour. It has Sp. Gr. 0·9784 (Air=1). It burns in air with a bright flame. A mixture with 3 vols. of Oxygen burns with violent explosion. At 0° C. and under a pressure of 42·5 atmospheres it is converted into a colourless liquid which boils at —102° C. The gas is very soluble in Alcohol and Ether. It is a constituent of illuminating gas.

As an anæsthetic, Ethylene has been experimentally shown to possess many advantages when deep surgical anæsthesia is required. A proportion of 80 to 90% of the gas is used. Analgesia comes on easily, respirations remain regular, no cyanosis or suggestion of asphyxia observed, and recovery from the anæsthesia is always rapid. Is usually administered with Oxygen.—A. B. Luckhardt and J. B. Carter, Jl. A.M.A., 1923, Mar. 17, p. 765, B.M.J.E. i./23, 62; P.J. i./23,456.

For a review of its anæsthetic uses *vide* L. ii./23,240. There were 14 instances of vomiting in a series of 92 inhalations.

The **relative toxicity** and potency of gas anæsthetics might be expressed as follows. Ethylene being taken as unity: Nitrous Oxide 0·85, Acetylene 1·5, Propylene 2·25, Butylene 4·5, Amylene 15.—F. H. McMechan, B.M.A. Ann. Meeting, 1926, L. ii./26,331.

UROLOGICAL OPERATIONS. Ethylene said to be the best anæsthetic, but its use requires a certain amount of experience. The average time for complete anæsthesia is five minutes, and as a rule awakening is without agitation or vomiting. Pantopon subcutaneously before administration suppresses period of excitation. It is highly inflammable and when mixed with Oxygen explodes on contact with flame.—Jl. A.M.A. ii./25,1742.

Ethylene resembles Ether in many of its effects, resembles Nitrous Oxide in speed, is less irritating to respiratory tract than Ether, but more so than Nitrous Oxide. Induction by Nitrous Oxide-Oxygen, followed by Ethylene-Oxygen at any stage of operation, returning to Nitrous Oxide-Oxygen towards close of operation. More depressing and powerful generally than Nitrous Oxide.—E. I. McKesson, B.M.J. ii./26,1111-1113.

Ethylene anæsthesia. Noticeable lack of after-effects the chief advantage. Methods of preparation and administration described.—C. Langton Hewer, L. i./25,173.

At Presbyterian Hospital, Chicago, 1,100 cases have been anæsthetised with Ethylene without fatality or serious condition.—L. i./25,1129.

A favourable report. Majority of patients make excellent recovery and are soon ready to take food or liquid. Precautions must be taken to avoid risk of explosion.—F. E. Shipway, L. i./25,1128.

Signs of anæsthesia with Ethylene and Oxygen.—J. S. Lundy, B.M.J. ii./26, 1112.

By continued application of Ethylene or Propylene green fruit can be ripened, the same changes taking place as occur in the plant.—P.J. ii./27,562.

Propylene and higher homologues as gas anæsthetics. These new anæsthetics show by-effects that, for the present, challenge their safety and utility in clinical anæsthesia. Experiments with Methane, Propane, Pentane and Heptane do not offer any hope of a satisfactory clinical anæsthetic.—F. H. McMechan, B.M.J. ii./26,1106.

Propylene as an anæsthetic.—Jl. Ph. & Exp. Ther., Feb. '26,1. See also F. E. Shipway, L. i./25,1130 and our p. *123.

Acetylene. CH≡CH = 26·016.

This, the initial member of the Acetylene series of hydrocarbons (*i.e.*, with triple linkage) is a gas with unpleasant odour. It has Sp. Gr. 0·92 (Air=1). It is compressible into a liquid. This *liquid* form has explosive properties. It is more soluble in Alcohol than Ethylene. It is formed by the well known interaction of water with Calcium Carbide.

Acetylene 40% and Oxygen 60%, with the addition of Oil of Pine to mask the smell, used as ***general anæsthetic.*** Rapid, simple and safe, but for child-birth, like all other general anæsthetics, its defect is to diminish uterine contractions.—C. H. S. Horwitz, L. i./23,619.

Give 60% to start with, increase to 70% for full anæsthesia and reduce to 20 or 30% in a long operation.—Precede with Morphine and Scopolamine.—L. ii./23,240.

Acetylene thought to be an inefficient anæsthetic except in exceptional cases.—F. E. Shipway, L. i./25,1128.

Acetylene-Oxygen anæsthesia likely to supersede Chloroform and Ethyl Chloride-Ether in many operations. Has greater safety, vomiting rare, sense of comfort afterwards, serious sequelæ not observed, but danger of explosion. A 10% concentration will eliminate labour pains without loss of consciousness or diminution of uterine contractions.—H. Wieland, Brit. Jl. Anæsth., Jan. '25, 142. per Pres., April '26,142.

A combination of Acetylene 80% with Oxygen 20% as a general anæsthetic induced insensibility and muscle relaxation in three minutes. Toxic effect very slight and initial phase of excitation did not occur.—Comptes Rend., Oct. 30, '25, per Jl. A.M.A. ii./25,1998.

In dental surgery Acetylene of value.—A. Goldman and J. D. Goldman, Anæsth. & Analges., Aug. '25,211, per Pres., April '26,142.

2,000 anæsthesias made with Acetylene at gynecologic clinic. No deaths; post-operative pneumonia in only 0·3%, and bronchitis in 0·3%. Surpassed in obstetrics all classical types of anæsthesia.—D.m.W., Sept. 18, '25, per Jl. A.M.A. ii./25,1437.

Dichlorethylene. *Syn.* ACETYLENE-DICHLORIDE $C_2H_2Cl_2$ = 96·93.

The commercial product is a mixture of two stereoisomers boiling at 48° and 60°, and having Sp. Gr. of about 1·28. It is not readily inflammable and is suggested to replace Ether for laboratory use. It is the best known solvent for rubber.

Is employed as a solvent of Iodine for sterilising the skin. 2·5% w/v is used, *i.e.*, practically a saturated solution. This solution is said to cause the operating surgeon or assistants no lachrymation or catarrh of the nasal mucous membrane which the Iodine Tincture produces.

N.B.—The name **Dichloride of Ethylene** has been applied to this substance, *v.* B.M.J. i./10,1288. It has the composition $C_2H_4Cl_2$=98·962 B. Pt. 85° C. and Sp. Gr. 1·255 at 15° C., but it should be particularly noted that Dichlorethylene is required for the purpose.—P.J. ii./11,623.

Iodine in skin asepsis—comparative results with Dichlorethylene.—J. W. Peck, P.J., i./12,450.

Trichlorethylene. *Syn.* ✱WESTROSOL (T.M. 310199 Class I).

$$\begin{array}{l} C.Cl_2 \\ \| \\ C.HCl \end{array} = 131{\cdot}379$$

= 131·379 Sp. Gr. 1·47, B.Pt. 88° C.—difficult to volatilise though a good solvent, especially for fats.

Trichlorethylene Sterules, 10 minims (0·6 Cc.) encased in cotton wool for inhalation, are made.

Uses.—Inhaled for trigeminal neuralgia several times a day.—B.M.J.E. i./22,86. In commerce for the solution of tarry bituminous products, Indiarubber, Sulphur, and Phosphorus.

∗WESTROPOL (T.M. 350667 and 352362, Class 2). A soap solution containing 25% Trichlorethylene and ∗WESTORAN (T.M. 433061)—a soap solution containing 95% Tetrachlorethane $C_2H_2Cl_4$ =167·844 were found efficient as vermicides. For cleaning the body, bathing, or sponging with soap solutions containing 2% Trichlorethylene or 10% Tetrachlorethane give good results. Further, a 25% solution of Trichlorethylene in Vaseline would be an efficient insect pomade. Dichlorethylene also useful.—J. P. Kinloch, B.M.J. i./15,1038.—P.J. ii./16,384; i./20,243.

The parasiticidal action of the Chlorhydrocarbons, especially of Tetrachlorethane.—J. W. Dougal, C. & D. i./25,199.

Tetrachlorethylene, C_2Cl_4 = 165·828. *Syn.* **Perchlor-Ethylene. Carbon Dichloride** (CCl_2). Heavy liquid (Sp. Gr. 1·619), B.pt. 110° to 120°, solvent of fats, resins, rubber and alkaloids. Used for dry-cleaning and for solvent soaps. Originally investigated by Faraday. Difficult to volatilise. Gives a heavy vapour which caused death in aircraft works when used in a cellulose varnish.—C.D. ii./14,845. (*cf.* Carbon Tetrachloride which is similar and has also produced death.)

All these bodies are non-inflammable and non-combustible.

Experiments as to its use showed that a mixture of 10% Petroleum Ether in it readily burns and a mixture of 10% Benzol with it will not burn, but any higher percentage burns readily

ANKYLOSTOMIASIS.

Trials with Tetrachlorethylene for hookworm showed no reason why this compound should replace Carbon Tetrachloride. The doses given were 2 to 4 Cc. in 2 ounces of saturated Magnesium Sulphate solution.—Col. Med. Report, p. 11, per Jl. Trop. Med., Feb. 1/27.

Tetrachlorethane. ∗WESTRON (T.M. 310198 Class I.). $C_2H_2Cl_4$ =167·844.

A mobile liquid with penetrating odour and B.Pt. about 140° C. It dissolves oils, fats, waxes, and resins, and Sulphur (1% at ordinary temperature), Phosphorus and Chlorine.

Used as a solvent for varnishes, especially Cellulose Acetate, and as a paint-remover and degreaser. Extensively employed as an insecticide, especially for white fly on tomato plants, and for weevils.

See also Westoran.

Pentachlorethane, C_2HCl_5=202·296, is similar to Tetrachlorethane, and has B.pt. 159°.

Hexachlorethane, C_2Cl_6=236·742.

A solid subliming at 185° without melting: almost insoluble in water, more soluble in Alcohol and Ether, or a mixture of the two. It has a smell similar to Camphor, for which it is used as a substitute in the Celluloid industry. Also employed to render substances non-inflammable in explosives industry, and is incorporated in anti-fouling plants.

Physiological experiments:—The saturated solution has no effect on muscle hence its toxic effect is considerably less than that of Chloroform (compared per molecule or per weight), with which of course it is chemically allied. Rats were fed with butter mixed with the crystals—no effect produced after 24 hours.

Cyclohexanol and Allied Compounds.

Cyclohexanol ($C_6H_{11}OH$) is prepared by the catalytic hydrogenation of Phenol, using Nickel at about 180° C. It is a solvent for fats, waxes, resins, rubber, celluloid, etc., but is principally used in conjunction with soaps—with which it forms clear aqueous solutions—as a detergent in laundry and textile work. The commercial product is known as **Sextol** in this country, and as ✱**Hexalin** (T.M. 409135) in Germany. Its derivatives, Cyclohexanol Acetate (Sextate) and Cyclohexanone (Sextone), and also the Methylcyclohexanols (Methylhexalin), produced by hydrogenation of the mixed Cresols, are similarly employed.

Trichlorisopropyl Alcohol. *Syn.* ✱ISOPRAL (T.M. 322543). $CCl_3.CH(OH).CH_3=163{\cdot}411$.

Used for intravenous narcosis. Has been given up to 8 Gm. (*in toto*) as an anæsthetic. A mixture of this and Hedonal (*vide* Edn. XVI., p. 783) may be useful.—R. K. Lambert, L. i./26,121, see also E. R. Flint, *ibid* 257. Employed in eclampsia in children.

CHRYSAROBINUM (*B.P.* '14) U.S., P. JAP., PH. NED. V.

$C_{30}H_{26}O_7$ = 498·208. *Syn.* Commonly but erroneously called CHRYSOPHANIC ACID.

Dose.—$\frac{1}{6}$ to $\frac{1}{2}$ grain (**0·01 to 0·03 Gm.**) or more.

This substance was erroneously stated to contain 80 to 84% of Chrysophanic Acid, but it was subsequently shown that the Acid was developed from the Goa Powder (*q.v.*) by the Alcoholic Solution of Potash used in extraction. It consists chiefly of Chrysarobin, with varying amounts of Chrysophanic Acid. *Further details, see Vol. II.* It is obtained from Araroba by means of hot chloroform.

It might be renamed '**Araroba Purificata.**'

A tasteless inodorous crystalline yellow powder. It is contained in rhubarb (mainly as Chrysophanic acid) and dock root. Ash limit 1%.

Solubility.—In water only slightly; in Ether 16, Chloroform 13 (at 25° C., U.S.). We found (1914) 1 in 12 in Chloroform, 1 in 18 Benzol. 'Not readily' in hot alcohol (Dott). Partly and sparingly in petroleum spirit.

Uses.—Externally as ointment or pigment. Chrysarobin is a powerful stimulant and parasiticide in acne rosacea, alopecia, psoriasis, lupus, ringworm of the scalp, pityriasis and tinea circinata.

PSORIASIS in the army treated by Chrysarobin and Salicylic ointments or in Lassar's Paste.—H. W. Barber, B.M.J. i./18,369.

The only reliable local remedy to remove the eruption with promptitude, but recurrence after its use just as frequent as with other remedies.—B.M.A. Ann. Meeting, '26, L. ii./26,550.

Unguentum Chrysarobini (*B.P.* '14).

This is prepared same strength as B.P. '98, *i.e.*, 4% but with Soft Paraffin. U.S. has 3 in 50 of Benzoated Lard.

It stains the skin and hair, and a strong ointment after three days' continued use sometimes produces feverishness and irritation. **5 to 10 grains to an ounce may be better.** Its stains can be removed by **Benzol, weak solution** of Potash or Chlorinated Lime.

Unguentum Chrysarobini Compositum (Unna) and St. J. H. Chrysarobin 5, Salicylic Acid 2, Ichthyol 5, Soft Paraffin 88.

Psoriasis is treated by an ointment of Chrysarobin 5, Salicylic Acid 2½, Birch Tar (Oleum Rusci) 5, Soft Soap 6½, Vaseline 6½.

Baculum Chrysarobini.

Chrysarobin 30 grains, Wax 20 grains, Lanolin 50 grains.

Ⓟ**Pigmentum Chrysarobini.**—*Adopted by G. H.*

Chrysarobin 1; Gutta Percha Solution (B.P. 1885), 9.

In psoriasis, painted on twice a day with a brush for ten days without washing—finally washing off

Ⓟ**Traumaticin** (*Martindale*), adopted by P. BELG., PH. ITAL. and PH. NED. V., composed of Gutta Percha (purified) 1, Chloroform (by weight) 9, is also used for making the above pigment. More cleanly than liniments or ointments.

Pigmentum Chrysarobini et Pyrogallol.

Chrysarobin 1, Pyrogallol 1, Ether and Alcohol, of each 10, Collodion 120. Apply after bathing every third day for psoriasis and ringworm. Chrysarobin may also be applied with Camphoid, *q.v.*

Ⓟ**Suppositorium Chrysarobini.**

Chrysarobin 1¼ grains, Iodoform $\frac{3}{10}$ grain, Belladonna Extract $\frac{1}{7}$ grain, Glycerin *q.s.* to make a suitable paste and Cacao Butter *q.s.* to 30 grains. Gives good results in hæmorrhoids.

Araroba. *Syn.*, **Goa Powder** (*B.P.* '14). **Crude Chrysarobin. Araroba Depurata, P. Austr.**=Chrysarobinum.

A brownish concretion from the cavities in the trunk of *Andira araroba* (*Leguminosæ*), dried and powdered.

Crude Araroba is imported from Brazil; not less than 50% of its weight is chrysarobin, or chrysophanic acid so-called. The Indian mode of using the drug was to cut a lime fruit, dip it in the powder and dab it on the affected skin. The Brazilians mix it with vinegar.

Eurobin. Chrysarobin-tri-Acetate. A brownish powder recommended as a substitute for Chrysarobin. Solutions of 2 to 3% are said to be effective and free from toxic effects, non-irritant, and do not stain. It is soluble in Ether, Chloroform and in Acetone. **Lenirobin is Chrysarobin-tetra-acetate.**

CINCHONÆ CORTEX.

(*Rubiaceæ*).

The principal dried barks used for the production of the salts of the Cinchona alkaloids are:—Red Cinchona bark, from *Cinchona succirubra*; Yellow Cinchona bark, obtained from *Cinchona Calisaya*, containing upwards of 6% of alkaloids (half of which is quinine); pale Cinchona bark (crown or Loxa bark), from *Cinchona officinalis* (containing 5% alkaloids of which half may be quinine); the bark of *Cinchona lancifolia*, Mutis; Columbian bark (containing about 2% alkaloids, of which only small proportion is quinine); and other species of Cinchona; that of certain species of Remijia may also be used. The variety most used for making galenical preparations is the cultivated Red Cinchona.

Cinchona, U.S., is from various species. 5% total alkaloids.

C. CALISAYA, Quinquina Jaune, is official in FR. CX. for making Extract. 1000 Gm. of good Calisaya Bark should yield 30 Gm. of Quinine Sulphate $(+8H_2O)$=25 Gm. approx. of anhydrous Quinine Sulphate=22 Gm. approx. of anhydrous Quinine.

C. SUCCIRUBRA, FR. CX. Quinquina Rouge is to contain at least 50 Gm. total alkaloid=15 Gm. Quinine Sulphate $(+8H_2O)=12\frac{1}{2}$ Gm. approx. anhydrous salt dried at 100° C.=10·9 Gm. approx. of Quinine base anhydrous—per 1000 Gm. of bark.

The Quinine barks, as they are called, now imported from South America, are chiefly the Calisaya in quills; those known as Cuprea barks, the produce of species of Remijia, are more expensive. A larger quantity of cultivated bark, the produce of *C. succirubra*, *C. officinalis*, and hybrids, arrives from Madras and other parts of India. Most of the rich Java bark, produced by *C. Calisaya, var. Ledgeriana*, has hitherto been shipped to Amsterdam.

The old natural "flat" Calisaya bark is not now met with, but a kind of yellow bark, pressed into flat pieces, is imported from Bolivia to replace it. The flatness is produced by tight packing in serons bound with green hide thongs which, contracting, keep it flat.

There is a large demand for 'Factory' Cinchona Bark, *i.e.* barks of Cinchona Ledgeriana and certain Cinchona hybrids, rich in Quinine and containing comparatively small amounts of other Cinchona alkaloids, for making Quinine. Effort should be made to produce in India sufficient of the commodity to meet a much larger proportion of the requirements of the Empire. There is at present only one Quinine factory making Quinine from bark in Great Britain.—Imp. Inst. Com. for India.—L. ii./22,526.

The **Amani Institute** (in what was German E. Africa) having passed into British hands, we are now in possession of some *C. Ledgeriana-C. Succirubra* hybrids which are amongst the most profitable species of Cinchona in the world from the standpoint of Quinine. Some were shown to yield up to 11·83% Total Alkaloid and 6·97% Quinine.—Prof. Greenish and C. E. Corfield, B.P. Conf., 1923, P.J. ii./23,95.

The only Cinchona it is possible to produce without financial loss is Yellow Bark, and this has put it beyond the power of our Empire to supply its own requirements as regards Quinine. History of the use and cultivation of the Bark.—B.M.J. i./24,1023.

For further details on History, Cultivation, etc., see Quinine and Vol. II.

Cinchonæ Rubræ Cortex, Red Cinchona Bark (*B.P.* '14). *Dose.*—5 to 60 grains (**0·3 to 4 Gm.**). P. HELV. has minimum 6·5% alkaloids. FR. CX. has 5%, *vide antea.*

The dried bark of the stem and branches of cultivated plants of *Cinchona succirubra.* Tested by *B.P.* '14 process, it should yield between 5 and 6% of total alkaloids, of which not less than one-half should consist of Quinine and Cinchonidine.

Flavorings—as for Quinine *q.v.*

Uses.—The bark in the form of the Liquid Extract, Tincture and its alkaloids has extended use as a bitter tonic. Taken, as such, in powder form it is astringent, giving a feeling of warmth in the epigastrium and occasionally causing vomiting. For further data see the Alkaloids Quinine, Quinidine, etc.

Decoctum Cinchonæ. B.P. 1885.—1 produced 16. *Dose.*—1 to 2 ounces (**30 to 60 Cc.**).

Elixir Cinchonæ. *Dose.*—½ to 1 drachm (**2 to 4 Cc.**).
Liquid Extract of Cinchona 1, Simple Elixir 7. Mix.

Extractum Chinæ.
Dose.—1 to 4 grains (**0·06 to 0·25 Gm.**).
Fr. Cx.—Aqueous extract containing not less than 6% alkaloids.
Ph. Ned. V., 14 to 18% alkaloids.

Extractum Cinchonæ Liquidum (*B.P.* '14).
Dose.—5 to 15 minims (**0·3 to 1 Cc.**)

This contains 5% of total alkaloids, and is an acid preparation; 1=about 1 of bark.

If prescribed with Acid, as in the following:—Spirit of Chloroform 1½ drachms, Nitro-hydrochloric Acid 1½ drachms, Liquid Extract of Cinchona 1½ drachms, Water to 6 ounces, mix the first three in order written, and pour into the water to produce best result.

Liquid extract of red bark has been much lauded in America for giving drunkards a distaste for alcohol.

Only about 20% of the total alkaloids in Cinchona can be extracted by Dilute Hydrochloric Acid, as in making this liquid extract Glycerin does not exert a solvent action on the alkaloids: best to add it at end of the process. The B.P. 1898 Assay process is best.—O. Chick, P.J. ii./17,144; C.D. ii./17, 612.

For further Notes on Assay, see Vol. II.

Fluidextractum Cinchonæ, U.S. *Average dose.*—15 minims. Standardised to 4·5% alkaloids, *w/v.*

Extrait de Quinquina Rouge (Fluide) Fr. Cx. Supp. 1920, is made by percolation with dilute Hydrochloric Acid and contains 3·5% total alkaloids.

Tinctura Cinchonæ (*B.P.* '14).
Dose.—½ to 1 drachm (**2 to 4 Cc.**).
About 1 in 5 of 70% alcohol; standardised to about 1% of alkaloids.
U.S. not less than 0·8 or more than 1% of alkaloids.

Maceration for 24 hours with ½ ounce hide powder to the pint is said to detannate the tincture.

Mistura Antidipsomania. N.H.W. (Not in E.G.A.)
Tincture of Cinchona 1 drachm, Glycerin ½ drachm, Tincture of Capsicum 3 minims Decoction of Cinchona to ½ ounce.

Tinctura Cinchonæ Composita (*B.P.* '14).
Syn. Huxham's Tincture of Bark. About 1 in 10 of 70% alcohol. *Dose.*—½ to 1 drachm (**2 to 4 Cc.**). **U.S.** is similar.

Vin de Quinquina Officinal (Fr. Cx.)
Macerate Cinchona 25 with Dilute Hydrochloric Acid 2, Alcohol 60% 75, for 24 hours, shaking occasionally. Add Red Wine 920, macerate 24 hours and filter.
Dose.—½ to 5 ounces (**15 to 150 Cc.**). Less for children.

Vinum Chinæ. P. Jap. IV. Dose 1 to 4 drachms. Dissolve Gelatin 1, by warming in Distilled Water 10, and add Sherry 1,000, Cinchona Bark in coarse powder 40. Macerate for eight days; press and in the expressed liquid dissolve Sugar 100, Tincture of Bitter Orange Peel 2: set aside in a cool place for 14 days and filter.

CINNAMOMI CORTEX (*B.P.* '14).

The dried bark from *C. zeylanicum* (*Lauraceæ*).

Dose.—10 to 30 grains (**0·6 to 2·0 Gm.**).

Aromatic, carminative and antiseptic, employed as flavouring agent. Contains volatile oil and tannin. Official are Compound Powder (1 in 3), Water (1 in 10), Spirit (1 of oil in 10), and Tincture.

P. Jap. IV. and U.S. X. have **Cortex Cinnamomi *Loureirii*, *Syn. Nikkei Bark*, Japanese Cinnamon Bark.**

Tinctura Cinnamomi (*B.P.* '14). *Dose.*—½ to 1 drachm.

1 in 5 alcohol 70%. Alcohol 60% would do equally well.

Tinctura Cinnamomi Composita P.L.

Dose.—20 to 40 minims (**1·2 to 2·4 Cc.**).

Cinnamon Bark 16, Cardamom Seeds 8, Long Pepper 5, Ginger 5, Alcohol 60% 640. Macerate seven days.

Oleum Cinnamomi (*B.P.* '14). **U.S.**

Dose.—½ to 3 minims (**0·03 to 0·2 Cc.**).

Contains 55 to 65% Cinnamic Aldehyde by volume. **U.S.** requires 80%. *For Analytical Data, see Vol. II.*

The light yellow oil distilled from the bark. The Chinese oil, as distinguished from that made in Ceylon, is known as **Cassia Oil.**

Leaf Oil is practically free from Cinnamic Aldehyde

Soluble in alcohol 90% about 10 in 3.

Cinnamon oil is used in influenza and catarrhs. Is occasionally prescribed as an inhalation (30 to 40 minims) with boiling water 1 pint.

Stimulates the heart reflexly and directly dilates blood vessels, thus exerting valuable action on vaso-motor system. Action on bronchial tubes anti-spasmodic. Should be given in 20 minim doses in milk (or on sugar) for first three hours, every other hour 15 minims for two doses, then three or four hourly 10 minim doses. If patient can take to bed cure will be rapid. (*See also* Oleum Eucalypti). Cinnamon oil relieves toothache.

In chronic deep-seated sepsis, such as internal venous thrombosis with pyrexia and other constitutional symptoms, more general use of Essential Oils advocated. It is a good plan to vary the Oil, *e.g.*, 10 minims four times daily in capsules of Cinnamon one day, Cloves the next, Peppermint, and so on. The antiseptics in this way saturate the system. Not on empty stomach.—H. French, Woolwich Medical Association.

Children exposed to infection by German Measles have been prevented from taking the disease by powdered Cinnamon—as much as will lie on a sixpence or shilling with their food night and morning. Should be tried in measles also as a prophylactic. Essence of Cinnamon in 25 drop dose one of the most effective remedies in cases of acute coryza.—W. B. Drummond, B.M.J. i./17,765; ii./17,32.

Capsules of Cinnamon Oil, 2½ minims increased to 5 minims, with **Quinine Sulphate** 1 grain, are used in influenza.

Cinnamon Dental Paste. Iodoform made into a paste with Cinnamon Oil.

COAL TAR DERIVATIVES.

The Aromatic series of derivatives from coal tar, so freely used as antipyretics and analgesics, produce changes in the blood, diminishing its respiratory capacity and destroying red corpuscles if used in excess. The following is a '*contra*' view of the utility of Antipyretics :—

FEVER IS A SALUTARY REACTION. Antipyretics are a fallacy. Fever eliminates the germs that cause the disease. Directly the internal temperature rises, the infective agents, ill at ease in a medium the temperature of which no longer suits them, seek to escape, and are consequently found in the urine, saliva and all products of secretion. This is no doubt the reason why the organism applies itself with such energy to maintaining the fever, and this in spite of antipyretics. To give them is wrong. Note the serious effects not uncommonly following them—syncope, collapse and heart failure. The patient must perspire. Sudorific drinks and saline laxatives must be given ; urinary secretion stimulated by Lactose, Urotropine and Theobromine ; the liver by small doses of Calomel, pulmonary secretions by Ammonium Acetate.—Paul Blum, Med. Pres., July, 27/21, per P.J. ii./21,115.

***Liquor Carbonis Detergens.** (*Wright's*). (T.M. 7418 & 7419).
(A formula for a solution is given in P.G. VI.)

This alcoholic preparation owes its properties in part to Phenol. Used as a Lotion, from 1 drachm to 1 ounce to a pint of distilled water it forms a yellowish milky emulsion; or, as an Ointment, Liquor Carbonis Detergens 1, Unguentum Hydrargyri Nitratis 3, Unguentum Simplex 4. In prurigo and chronic scaly skin diseases.

The following is also useful in eczema : Liquor Carbonis Detergens 2, Liquor Plumbi Subacetatis 2, Zinci Oxidum 4, Glycerinum 4, Aqua 36. *Vide also* **Wright's Coal Tar Soap.**

A ***Coal Tar Inhaler and Vaporiser** is made for treatment of whooping-cough, croup, bronchitis, influenza and like affections.

Balneum Picis Carbonis. *Syn.* **Balneum Bituminis,** L. H.
Solution of Coal Tar 8 ounces, Water at 95° F. 30 gallons.

Lotio Plumbi Detergens, V.H.C. One drachm to a pint of water.
Liquor Carbonis Detergens 1, Liquor Plumbi Subacetatis Fort. 2½.

Unguentum Picis et Acidi Salicylici, V.H.C.
Liquor Carbonis Detergens 30 minims, Salicylic Acid 15 grains, Ammoniated Mercury 5 grains, Soft Paraffin to 1 ounce.
In psoriasis 1 in 8 and in pruritus ani.

Liquor Picis Carbonis (*B.P.* '14).
A solution made by dissolving Prepared Coal Tar 2, in a 10% Tincture of Quillaia Bark 10 parts made with 90% Alcohol at 50° C. and filtering.

Lotio Picis Carbonis Alkalina. St. Th. H.—Liquor Picis Carbonis 1 drachm, Sodium Bicarbonate 120 grains, Water to 1 pint.

Lotio Picis Carbonis Aromatica.
Coal Tar 3 ounces, Ether 2 ounces, Spirit 1 ounce. Dissolve, filter and add Peruvian Balsam 6 drachms, Salicylic Acid 1½ drachms.

Liquor Picis Ligni may be prepared by dissolving Wood Tar 1 in 20 of a Tincture of Quillaia 1 in 10 of Alcohol 90%.

One part to 7 or more is useful for skin affections. The Tincture of Quillaia enables tar solutions to form emulsions with water.

Aqua Picis, Ph. Ned. V., 5%, by mixing with Pumice.

Alopecia areata treated by this preparation and occasional application of **Burt's Fluid** (a special preparation). Hair grew completely.—P. S. Abraham.

Bitumen. A name given to various inflammable hydrocarbon mixtures, even colorless naphtha or rockoil of Sp. Gr. 0·7 to 0·8, but in this country we should associate it with Asphalt or of similar consistence. The name is also given to the residue after distilling petroleum products. Liquor Bituminis, *Syn.* **Bitumarine** is an anticorrosive paint.

Acriflavine. *Syn.* **Diamino-Methyl-Acridine Chloride Hydrochloride.** $C_{14}H_{14}N_3Cl.HCl.=296·058$. (Graphic in Edn. XVII.).

The compound originally called **Trypaflavine** in Germany was initially called Flavine here, but the latter name was abandoned as it is applied to a vegetable dye. The substance is the subject of Casella's British Patent No. 24,652 of 1910 (D.R.P. 243085) and is now expired. The name Acriflavine was agreed to by the Board of Trade on the understanding that licensees of the patent, during its validity, should manufacture the compound under that name only.

Chemical Composition.

There appear confused statements in the literature as to the composition of this body. It is the Hydrochloride as indicated in our formula, and our analyses confirm the statement. In comparison with Euflavine, which is a monochloride, Acriflavine may be viewed as a dichloride.

***Trypaflavine.** TRADE MARK (No. 327437, Class 1), Suspended under Temporary Rules Act, but renewed 1924. Permit was granted to two British firms to use.

Manufacture.—Details of the process are given by Benda (Ber. 45, p. 1787, *et seq.*) and in the patent specification. See also Edn. XVIII., p. 313.

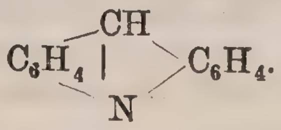
In the patent specification it is stated that, compared with its higher homologues, such as Acridine Yellow (which is 3 : 6—diamino—2 : 7 dimethylacridine Hydrochloride) this body has the advantage of being very soluble, and these hitherto 'unknown salts of 3 : 6 Diamino—10 alkyl or aralkyl Acridine have proved specifics against trypanosomes.'

It might be made by a method other than that of the patent.—See C.D., July 14/17, page 609.

Acridine Compounds—3 : 6 Diamino - Acridine preparation.—Poulenc Freres & R. Meyer, Pat. 137,214 Abst. J.C.S.A. i./20,252.

Properties.—The compound is in the form of a reddish brown crystalline powder.

The trypanocidal property depends greatly. Browning says, on the presence of the methyl group attached to the Nitrogen atom—this is implied, though not expressly stated, in Benda's work.

It may be added that the Acridine series of dyes have as initial member **Acridine**  $C_6H_4\begin{matrix} CH \\ | \\ N \end{matrix}C_6H_4$. They are formed by heating Diphenylamine with fatty acids in presence of Zinc Chloride, *e.g.* $(C_6H_5)_2NH+H.COOH = (C_6H_4)_2N-CH + 2H_2O$.

Solubility.—In water 1 in 5. Commercial samples we find vary considerably. In alcohol 1 in 40. In glycerin 1 in 4 or less. Insoluble in liquid paraffin, oleic acid, vaseline and eucalyptol—by experiment.—W. H. M., 1917. Concentrated aqueous solutions are brown, dilute ones lemon yellow with green fluorescence.

Compatible with Normal Saline if required for immediate use, but we observe a deposit after about 24 hours. Concentrations of Saline higher than 5% throw out a precipitate almost at once.

Compatible with 0·5% Sodium Citrate.

Incompatible with Dakin's Solution, Eusol and other Chlorine Antiseptics. Also with Mercuric Chloride Solution (*e.g.* 1 in 1,000 as used), also with Phenol (*e.g.*, 1 in 20 solution)—by our experiments.

Solutions may be boiled or heated in an autoclave to 130° C.

To remove Acriflavine stains from the hands, etc.—Rub with a little dilute Hydrochloric Acid or with a little dilute Sulphurous Acid, or with Sulphurous Acid followed by Hydrochloric Acid, and then wash with water. Either of these procedures is effectual.

Internal Use.—Dr. A. Houlgrave wrote to us :—" I took two or three 1/8 grain doses of Acriflavine and noticed nothing definite, then I took three ¼ grain doses evening, morning and evening. The only effects noticed were that I perspired heavily on the night of the third dose."

Pills of Acriflavine 1/12 grain (0·005 Gm.), have been prepared.

5 grain doses have been given in cachet in an illness assumed to have connection with trypanosomes, patient tolerated the dose, but there was no apparent result.—W. A. Findlay, Oct. '27.

Euflavine *q.v.* is now generally employed for internal use.

Antiseptic Powers.—It possesses marked antiseptic and in particular trypanocidal powers, hence the name Trypaflavine.

It is specially active *in presence of serum.*

According to C. H. Browning and his co-workers, the ideal antiseptic must have a great potency in the presence of serum—Acriflavine has; it must stimulate granulating processes; it should not interfere with phagocytosis, and must not be irritating to the tissues. The potency of Acriflavine, it is stated, is not merely unimpaired by blood proteins—it is enhanced by their presence.

The members of the group of Diamino-Acridine derivatives in the presence of serum are the most potent bacterial agents known and the property of being enhanced in this activity by serum is shared by no other type of chemical compound that has been investigated.

The closely allied substance Diamino-Acridine Sulphate (**Proflavine**) has similar properties, though it is not so active in curative properties in experimental trypanosome infections.

Intravenous injections into rabbits showed that this Acridine Sulphate compound will render the blood serum antiseptic or greatly augment its bactericidal power—this is still manifested several hours after injection.—C. H. Browning and R. Gulbransen, Proc. Royal Soc., B. Vol. 90, 1917, p. 140.

The list of bodies investigated included Phenol, Iodine, Hypochlorites, Malachite Green, Mercuric Chloride, Crystal Violet and other dyes. Acriflavine has been found to be 20 times more powerful against *Staphylococcus aureus* than Mercuric Chloride and 800 times more so than Phenol or Chloramine-T in these conditions of testing.

With regard to the second point, the authors claim that most antiseptics are very inimical to phagocytosis, hence their action is a very mixed blessing. The higher the germicidal power in the presence of blood serum and the lower the hindering of phagocytosis the more useful is the antiseptic.

Acriflavine Solution 1 in 1,000 does not interfere with phagocytosis. For methods of estimating influence of antiseptics on leucocytes *in vitro* see Wright's Method and *in vivo*—*vide* C. J. Bond, B.M.J. ii./17,71.

The Therapeutic Coefficient ("T.C.") of Browning is the ratio between the highest concentration of the substance, which does not reduce the phagocytic count below half that of the control, to the weakest concentration of the body, which is sufficient to kill *Staphylococci* in the presence of serum. Acriflavine and Brilliant Green gave the highest ratios. Acriflavine is less irritating to conjunctival epithelium than Brilliant Green. Both stimulate granulation in wounds.

The "T.C." of Acriflavine is 200, *i.e.*, it kills both *cocci* and *B. Coli* in concentration of 1 : 100,000, whereas to affect phagocytosis a concentration greater than 1 : 500 is requisite.

T.C. of Mercuric Chloride is $\frac{10000}{7000} = 1{\cdot}4$; of Phenol $\frac{250}{500} = 0{\cdot}5$, and so on.

The germicidal value of Acriflavine on staphylococcus in Broth and in human serum and in pus was found lower than that given by Browning. Its action too is very slow, not less than 24 hours' contact being adopted by Browning for the experiments. Staphylococcus in pus is not killed by 1 in 1000 Solution.—R. T. Hewlett, L. ii./17,493,727.

Browning turned the table by replying that the view that a substance to possess therapeutic value as an antiseptic must rapidly kill organisms is a time-hallowed test—witness phenol and mercuric chloride which do not put an end to suppuration in an infected wound.—*ibid*—p. 622.

A. Fleming issued a strong criticism of use of Acriflavine maintaining that its use is "therapeutically unsound" and that there is nothing to specially recommend it for use to septic wounds. A concentration of 1 in 2000 he finds inhibits leucocytic emigration, that even 1 in 3200 strongly agglutinates human red corpuscles, that 1 in 500 solution is usually unable to sterilise an equal volume of pus from a wound in 24 hours, that 1 in 500 injected into the pleura or peritoneal cavities loses its antiseptic power in 2 hours.—L. ii./17,341. An equally powerful reply by C. H. Browning.—*ibid*, 437. A. Fleming's rejoinder.—*ibid*. 508.

CHEMOTHERAPY OF PYOGENIC INFECTIONS WITH SPECIAL REFERENCE TO THE ANTISEPTIC PROPERTIES OF THE ACRIDINE COMPOUNDS. The flavines appear to be the most efficient antiseptics from the therapeutic standpoint so far investigated by the authors. *Staphylococcus aureus* and *B. Coli* used. '**Fragments**' of the Acridine Molecule were examined—these showed a low grade of antispectic power—as also **Phenazine** Compounds.—C. H. Browning and J. B. Cohen, B.M.J. ii./21,695.

Strengths of Acriflavine Solutions for Use.—Solutions of 1 in 1,000 in normal saline are recommended. This strength (= on the basis of bactericidal concentration to an 80% Phenol solution in the case of *Staphylococci*) is used to the surface of wounds without causing pain or local irritation.

The dye is advised for prompt use to wounds, soon after infliction, to prevent sepsis, by destruction of virulent organisms before they have time to gain a foothold and to multiply—*e.g.* for casualty work, this solution may effect healing by first intention.

The muscles round the site of an infected wound may be injected with several ounces of 1 : 1,000 solution without ill effect.

Acriflavine Tablets are made 0·87 grain to produce 2 ounces of 1 in 1,000 solution, also 1·75 grains to make 4 ounces.

Use in conjunction with Hypertonic Saline.—The 1 in 1,000 solution is not precipitated by adding Sodium Chloride up to 5% strength or by 0·5% Sodium Citrate.

Suppurating Wounds.—Acri- or Proflavine solution 1 in 1,000 is used to swab out the open wound once or twice a day *after free drainage has been* *secured.* All the crevices of the wound are to be reached and sloughs, etc., removed. Then lightly pack with gauze steeped in the solution and cover with a piece of "protective" to prevent evaporation. Several ounces of the solution may be safely left in the tissues or peritoneal cavity. In cases showing spreading inflammatory conditions, it is well to inject the antiseptic into the part and especially around the edges with a hypodermic serum syringe.

When the infection has been practically overcome, weaker solutions, *e.g.*, 1 : 5,000, may be used or the treatment may be intermitted for a day every few days, dry dressing being substituted in the intervals, or "stimulating" applications, *e.g.*, Brilliant Green solution 1 in 1,000, may be employed.

Inlet tubes may be used, but frequent periodic flushing, *e.g.*, every two hours, with an aqueous solution (Carrel's method) is to be *avoided.*

One must recall that suitable concentration of serum is required to produce the full activity of these antiseptics. Brilliant Green in 1 in 2,000 solution is, however, much more powerful than these bodies in aqueous solution, but rapidly inactivated by serum; the latter has given good results by Carrel's method.

Gauze steeped in the solution is specially favoured as the dressing need only be changed once or twice in 24 hours.

Prophylactic Use before onset of Suppuration.—A contaminated wound, within the first few hours of infliction, if thoroughly cleaned with 1 in 1,000 solution—as much as possible being left in the cavity—may be sewn up and will heal by first intention. The same result may be expected in war wounds if similar facilities are permitted, but on the whole this is not favoured. It is better to pack the wound with the soaked gauze for three or four days after requisite surgical procedure. Suppuration may thus be aborted in many cases. Inject the solution into the surrounding tissues and muscle planes with a syringe and fine needle as previously mentioned, if there is extensive damage to the tissues.

The use of Acriflavine is also advocated at the time of secondary operations to prevent the recrudescence of sepsis when operating in an area already affected.

Intravenous Injection.—The preparation has been tried even to the amount of 300 Cc. of 1 in 1,000 solution. The injection is given slowly—at the rate of 50 Cc. per minute. The method has not been largely practised. *Euflavine is preferable.*

Acriflavine has selective injurious action on liver and kidneys when injected intravenously in rabbits.—Jl. A.M.A., Jan. 17, '25,166, per Pres. Jan. '26,6.

EPIDEMIC ENCEPHALITIS well treated with intravenous injections of Neutral Acriflavine, 8 consecutive injections of 10 Cc. of a 0·5% solution being given. Injections given slowly at rate of 10 Cc. in 5 minutes.—B.M.J.E., i./26,34.

GONOCOCCAL INFECTIONS OF THE URETHRA.—Intravenous injections of Acriflavine 0·3 Gm. in 100 Cc. Normal Saline, followed at weekly intervals by second and third injections and a week later by 0·4 Gm. in 130 Cc., were of varying activity. A special apparatus for injection is described.—Jl. R.N.M.S., Oct. '25,250.

TUBERCULOSIS.—Neither Acriflavine in doses up to 0·2 Gm., nor Mercurochrome up to 0·005 Gm., had any recognisable effects in the treatment of tuberculous patients. A case of septicæmia, complicating ischio-rectal abscess, which had as a maximum dose 0·01 Gm. of Acriflavine seemed to show definite improvement. 1 Cc. of Acriflavine 1 in 5 has been injected intravenously.—G. R. Gittins, B.M.J., i./27,857.

Neither staphylococcal nor streptococcal infections are touched by Acriflavine, when distributed to them through the blood stream.—E. L. Walker, Jl. Pharm. & Exp. Therap., XXVI., No. 6, p. 461.

Subcutaneous and **Intramuscular** injections of 5 to 10 Cc. of 1 in 1,000 solution have been given.

PULMONARY TUBERCULOSIS.—Advanced cases greatly improved following hypodermic injection of a 1 in 1000 solution of Acriflavine in normal saline, the first dose being 5 minims, increased to 10 minims every 48 hours, and further to 25 minims every 4th day. As much as 40 minims twice a week given.—G. H. Johnson, B.M.J., i./26,567. *See also* R. Aidin, B.M.J., ii./27,217.

Threatened sepsis of knee joint aborted by injection of 30 Cc. of 1 in 1,000 Flavine.—W. H. Hillyer, L. i./18,103.

Internal Urinary Antiseptics.

The relatively non-toxic internal urinary antiseptic, active in high dilution in the urine and eliminated in high percentage by the kidney, without injury to the body, does not exist. Some 200 dyes were examined, the method of investigation being to find (1) antiseptic power, or otherwise, of 1 in 1,000 solution on Agar (2) antiseptic value in urine. Only 24 prevented the growth of the Colon Bacillus in urine in a dilution of 1 in 1,000, and of these several were effective in alkaline urine only. As to toxicity and excretion, intravenous doses of 5 to 25 mgm. per kilo were given to rabbits. Several dyes, *e.g.*, Malachite Green, Brilliant Green, and Crystal Violet were exceedingly toxic, causing convulsions and death within a few minutes. On the other hand, Auramine was tolerated.

The next step was to determine the experimental urinary antisepsis, *i.e.*, to determine whether passage through the blood-stream and kidney, by giving intravenously, would interfere with antiseptic powers, and whether enough could be administered to cause adequate concentration in the urine.

In the first category, namely, killing power of a plain solution of 1 in 1,000, relatively few were capable of killing *B. Coli*, *Staphylococcus Albus* and *S. Aureus*. These were, *e.g.*, Auramine, Crystal Violet, Methyl Violet, Gentian Violet, Methylene Blue. In the presence of urine Methyl Violet B, Crystal Violet, and especially Methyl Violet have enormous powers against the Staphylococci, both in acid and alkaline urine.

With regard to excretion and toxicity ***Auramine*** and ***Auramine G.*** were tolerated ***in a dose of 10 mgm. per kilo intravenously.***

Finally, Acriflavine and Proflavine were the only two out of the 13 with which it was possible to cause secretion of antiseptic urine by intravenous use.

A dye suitable as an internal urinary antiseptic may yet be discovered

The paper apparently intends to convey that there is no dye suitable, either for use ***by the mouth or intravenously,*** to act as a urinary antiseptic, with the exceptions of ***Proflavine and Acriflavine,*** and these were given in a dose of 10 mgm. per kilo to rabbits.—F. G. Davis, Am. Jl. Med. Sci., Feb. '21, No. 2, p. 251.

Emulsion of Acriflavine in Liquid Paraffin 1 to 1,000.

Thoroughly clean and sterilise with spirit a pestle and mortar of ample size. Place 0·1 Gm. Acriflavine in the mortar, thoroughly powder and dissolve in 1 Cc. of Alcohol 90%. The substance may not dissolve entirely. The particles should be made into as fine a condition as possible.

Place 1 Gm. of White Wax B.P. in an enamelled saucepan, melt it carefully, and add 99 Cc. of Liquid Paraffin, and heat together to 110 or 120°C., then gradually add this mixture to the Acriflavine in the mortar with continual stirring. This produces an emulsion or suspension of 0·1% strength. Stronger or weaker dilutions may be prepared.—W. H. M.

Another formula.—**Acriflavine 0·1, Thymol 0·005, White Wax 4, Liquid Paraffin 76, Water 20. Wounds and tuberculous glands well treated.—T. E. A. Stowell, B.M.J. i./19,244.**

Applicatio Acriflavine Gt. Orm. H. is similar strength.

IMPETIGO CONTAGIOSA.—The 1 in 1,000 Emulsion in Paraffin the most suitable treatment.—A. R. Balmain, L. ii./26,487.

ACRIFLAVINE SOAP PASTE prepared by neutralising Stearic Acid 1 with Sodium Carbonate 1¾ and incorporating 0·1% Acriflavine, also a Starch Paste or Mucilage with 0·1%.— C. J. Bond, B.M.J. ii./17,6.

Literature on Acriflavine.

For the original paper advising the therapeutic use of this dye, see C. H. Browning, R. Gulbransen, E. L. Kennaway, and L. H. D. Thornton, B.M.J. i./17,73. See also D. Ligat, B.M.J. i./17,78.

Gauze soaked in 1 in 1,000 solution in Normal Saline but 1 in 5,000 for subsequent applications is enough. For Carrel's irrigation method 1 in 10,000. The primary dressing need not be changed for two or three days.—H. Drummond and J. W. McNee, L. ii./17,640. See also Sir A. Bowlby, L. ii./17,640.

The Carrel-Dakin process is not of universal application on account of inherent difficulties in technique, but for ease of application, early cleaning of wounds, and abatement of reaction to absorption, the dye is admirable.—**E. M. Pilcher and A. J. Hull, B.M.J. i./18,172.**

Acriflavine is more potent than Proflavine. 1 in 4,000 thought efficient for a wound infected with *strepto.* or *staphylococci.*—W. Parry Morgan, L. i./18,256.

A film or coagulum liable to form on the surface of wounds—not easy to remove.—M. Pearson, B.M.J. i./18,271.

Sepsis can be prevented by the primary use of Flavine-soaked gauze. Formation of a yellowish pellicle in three or four days is a sign for change to Eusol or Brilliant Green or Magnesium Sulphate.—H. M. Savery, B.M.J. ii./18,283.

In influenza epidemic Acriflavine spray 1 in 1,000 seemed to have some preventive effect.—B.M.J. ii./18,111.

GONORRHŒA treated by lavage with 1 in 4,000 Acriflavine—one pint used twice daily.—D. Watson, B.M.J. i./19,571. See also H. E. Gibson, L. i./19, 741. Also by 1 in 1,000 Acriflavine with 2% Alkali.—J. Armstrong, B.M.J. ii./19,170. See also W. M. Browdy, Pr. Oct. 1921, and B.M.J. i./23,1080.

CONJUNCTIVITIS and gonorrhœal ophthalmia well treated by 'Flavine' 1 in 4,000.—P. Ganguli, Pres., Feb./21,70.

OPHTHALMIC SURGERY.—Flavine 1 in 4,000 can be safely dropped into the eye twice daily to prevent septic sutures.—Sir A. Lawson, B.M.J. ii./27,1129.

Corneal wounds well treated.—C. Killick, per Pres. Feb./23,75.

Burns and pyogenic conditions well treated. No interference with granulation.—C. Bennett, J.W.S. Blacklock and C. H. Browning, B.M.J. ii./22,306.

OTORRHŒA.—A few drops of ½% solution in distilled water, of value.—S. N. Consul, I.M.G., Aug. '25,374.

PHOTODYNAMIC PROPERTIES of neutral Acriflavine. *Leishmania, Treponema, Spironema,* and *Leptospira* killed by dilution of 1 : 50,000 without aid of special light and in dilution of 1 : 10,000,000 with aid of actinic rays—arc lamp or sun's rays sufficient. Rays most energetic when passed through a blue filter. Suggested for use in leishmaniasis and various forms of spirochetosis.—H. Noguchi, Int. Conf. Trop. Am., '24,469.

Neutral Acriflavine in concentrations of 1 in 100 to 1 in 1,000 caused survival in guinea-pigs infected with highly virulent diphtheria bacillus. It was 50 times more effectual than Phenol. B.I.P.P. not found effective.—C. H. Browning and R. Gulbransen, B.M.J., i./25,688.

Flavine-Starch poultices in the treatment of eczema. 4 tablespoonfuls of Rice Starch and 10 grains (0·6 Gm.) of Acriflavine mixed with cold water; 1 pint of boiling water added, and the mixture boiled till it thickens. When nearly cold pour on to dressing cloth, to form a layer ½ inch thick. When cold and set, cover with a layer of gauze and apply to part. Change 3 or 4 times a day and bathe part at each change with Acriflavine 1 in 1,000 in 0·85% NaCl. Resistant cases of seborrhœic eczema successfully treated by his method.—Jl. Trop. Med., June 1/23,196.

In animal treatment, *e.g.*, throat canker and one eyed cold in pigeons, 1 in 200 solution used as swabbing, efficacious.—Pigeons and Pigeon World, July 16/1920.

✱**Peracrina** (T.M. 443098). A combination of Trypaflavine and an albuminous substance, found in preliminary experiments to have a beneficial action in malaria.—L. i./25,195.

Euflavine. *Syn.* NEUTRAL ACRIFLAVINE, DIAMINO-METHYL-ACRIDINE CHLORIDE. $C_{14}H_{14}N_3Cl + H_2O = 277·609$.

This substance, being more basic than Acriflavine, is even less irritant to mucous tissues and more suited for use *intravenously.*

Uses and Dosage.—As for Acriflavine. Stronger solutions can be employed. For *local use* to wounds 1 in 1,000 to 1 in 500. For *bladder irrigation and urethral injection* 1 in 4,000 to 1 in 1,000. For skin infections 1% in Alcohol.

Intravenously 1 in 1,000 to 1 in 200 in lymphangitis, enlarged tuberculous glands and threatened sepsis. 50 to 100 Cc. of this has been given.

Euflavine Tablets 0·87 grain, with Sodium Chloride, make

2 ounces of 1 in 1,000 solution ; also 1.75 grains to make 4 ounces of solution.

Euflavine may be used in gonorrhœa, *cf.* W. M. Browdy, Pr. Oct. 1921.

Containing about 1·5% Sodium Chloride as stabiliser, it does not smart like Acriflavine.—P.J. i./23,85,564.

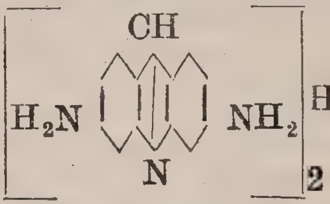
Puerperal septicæmia and pyæmia. 'Flavine' 1 in 1,000 of Saline intravenously as a routine. *Dose.*—10 to 15 Cc. One per diem, but in severe cases, 2 doses.—B. Whitehouse, B.M.J. ii./20,267.

Internal Use.

Tablets are prepared 'Enteric coated' ½ grain, and 1 grain.

Further references to this compound are given under Acriflavine.

Proflavine.—*Syn.* 3 : 6. - **Diamino acridine sulphate.**



H_2SO_4=516·312.

This aniline dye precedes Acriflavine in manufacture by severa steps—hence it is the cheaper of the two.

PATENT. The method of making is embodied in the Acriflavine Patents *q.v.* It was, however, also the subject of Casella's D.R.P. 230412 ("Manufacture of 3 : 6 Diamino-Acridine") British Patent 24652/1910—the latter has now expired.

This Brit. Patent covers the same ground as the two German Patents 230412 and 243085 (Acriflavine).

For a description of the process see our Edn. XVIII., p. 318, *dealing with Benda's paper (Ber.* 1912, *p.* 1787).

Chemical Note.—Though a diamine, this body, as will be seen by the formula, functionates as a mono-acidic base. Titration shows one molecule of H_2SO_4 *to two of base.*

(*Samples of Proflavine of commerce which we have examined have been the* HYDROCHLORIDE *of the formula* $C_{13}H_{11}N_3.HCl$. NOT *the sulphate.*)

It is in the form of a coarse brown powder. The concentrated aqueous solution is brown. It stains the skin yellow similar to Acriflavine. Dilute solution is also light yellow with fluorescence.

Solubility.—In water 1 in 140, in Alcohol 90% 1 in 48, in glycerin 1 in 10 or less, insoluble in liquid paraffin, oleic acid, vaseline and eucalyptol—(by our experiments, 1917).

Compatible with Normal Saline Solution as distinct from Acriflavine (*q.v.*).

Antiseptic Powers.—This compound resembles Acriflavine in being strongly bactericidal for all the common pathogenic bacteria. As weak a solution of Proflavine as 1 : 200,000, it is stated, will kill *staphylococcus aureus* in the presence of serum.

The general toxicity of Proflavine for mice as tested by subcutaneous injection, and the irritating effect of concentrated solutions on the conjunctiva, are markedly less than those of Acriflavine. They may be supplied to the peritoneum with safety.—C. H. Browning and co-workers.

Uses.—Similar to those of Acriflavine, but it is stated to differ in that it exerts a degree of hæmostatic action.

Proflavine Tablets.—0.87 grain (with Sodium Chloride) make 2 ounces of 1 in 1,000 solution ; also 1·75 grains with Sodium Chloride to produce 4 ounces of solution.

Proflavine Bougies. Contain ½ grain (0·03 Gm.) in Theobrom Oil basis ; 4 inches long.

Lotio Proflavine (Pro Oculis).

Proflavine 1 grain in 10 ounces.

***Rivanol** (T.M. 451097). *Syn.* ETHOXY-DIAMINO-ACRIDINE LACTATE.

A yellow dyestuff soluble about 1 in 15 of water. Used in 1% or 2% solution as a local antiseptic for abscesses, furunculosis, and the like. Injections need the addition of Novocain (¼ to ½%).

The dye has powerful antiseptic action. Recommended in acute and chronic conjunctivitis.—W. Rumbaur, M.m.W., June 19, '25,1031, per Pres. Feb. '24,62.

Nomenclature and formulæ of medicinal dyestuffs.—G. M. Dyson, P.J. i./26,101.

Aniline. *Syn.* MONO-PHENYLAMINE, ANILINE OIL. $C_6H_5NH_2$=93·064.

A colorless (when freshly distilled) oily liquid, with Sp. Gr. 1·027. Of burning taste, soluble in alcohol and oils, slightly in water.

Antidotes.—Fresh air, emetics, alkaline salt (NaCl) solution, sodium sulphate, artificial respiration, oxygen, transfusion.

Poisoning by a boy drinking less than 2 Cc. of a water and aniline mixture. Final recovery under Oxygen given through a Nitrous Oxide bag for 5 minutes at a time with intervals of 15 minutes, instead of constantly through a funnel —far better this way.—J. Inkster, L. ii./26,752.

Poisoning by Aniline and Nitrobenzene. A particular shoe dye containing Aniline caused five cases of poisoning in America, and even the Aniline laundry-mark on diapers has produced effects in infants.—L. ii./25,262.

Aniline intoxication may be produced either by absorption *per os* or through the skin, and in its acute stage cardiac and not respiratory treatment is indicated. Methods of detection in blood and urine.—Jl. Ph. & Exp. Ther., Mar. '26,101, *et seq.*

The term 'Aniline poisoning' is intended, when considering industrial poisoning, to include the hemolytic action of red blood cells, to which the term 'Anilism' has been given.—L. ii./27,289.

Tetryl. *Syn.* TETRA-NITRO-METHYL-ANILINE. An explosive; causes dermatitis amongst women workers. Severe cases treated by steaming with subsequent application of wet cloths. This reduces swelling and allays irritation. It stains the skin yellow. Calamine lotion used with success subsequently, or an ointment of Zinc Ointment, Castor Oil and Lanoline. Lead lotion to be avoided; Lead has a dangerous affinity for Tetryl.—B.M.J. i./16,618.

Note.—Claessen (Fr. Pat. 355695, 1905) proposed this body and the Ethyl analogue as detonating explosives. Will (U.S. Pat. 827768, 1906) uses the same compound mixed with Mercury Fulminate.—Thorpe, *Vol. II.*, p. 467.

Aniline Sulphate. $(C_6H_5NH_2)_2H_2SO_4$=284·208. *Dose*—½ to 3 grains **(0·03 to 0·2 Gm.).**

Has been used for emphysema and asthma; must be used cautiously, as it may cause cyanosis.

Paraphenylenediamine. $C_6H_4(NH_2)_2$=108·084.

Prepared by nitrating Acetanilide and subsequent reduction with Tin and Hydrochloric Acid. In white or reddish crystals soluble in water, Alcohol and Chloroform.—M.pt. 140° C.

For use as hair dye, apply first a solution 2% with 1·5% Sodium Hydrate, then an oxidising agent, *e.g.*, 5% Ferric Chloride to give brown or 3% H_2O_2 to produce a black shade. May produce skin eruptions, eczema, etc, nausea or nervous symptoms, sleeplessness, dizziness, weakness, etc., or impairment of vision.—B.M.J. ii./09,812; P.J. ii./09,535. Should prohibit sale.—L. i./10,66.

The only cure, when ladies are affected by skin eruptions from use of hair dye containing it, is by shaving the head. It is cheaper than Silver Nitrate, hence probable reason of its use by hairdressers.—B.M.J. ii./09,918.

A patent specification says the addition of Sodium Sulphite 1 to 1 renders it harmless.—P.J. i./11,804, 823.

Mrs. Potter's Walnut Juice Hair Dye is well known to contain Paraphenylenediamine as active ingredient. A case of acute catarrhal eczema of the face and scalp caused by it yielded to the use of Iodine Ointment reduced one third strength by Petrolatum —P.J. ii./12,301.

Though toxicity has been reduced by converting Paraphenylenediamine into Sulphate, idiosyncrasies still occur. Tolylenediamine with Sodium Sulphite occur in 'Primal'—usually non-irritant —B.M.J.E., Apl. 24/1914.

Paraphenylenediamine hair case. INECTO LTD., issue a warning on the subject of the use of Inecto, which contains Paraphenylenediamine and Resorcin, but this was not sufficient to protect them in the action—later warnings were more complete. Damages £200.—B.M.J. i./22,373.

The œdema of head, neck, tongue, eyelids and face is the first stage in general swelling, and it is suggested that it is due to a change in the composition of the blood.—O. S. Gibbs, Jl. Pharm. & Exp. Ther. per P.J. i./23,233.

Œdema produced in animals by Paraphenylenediamine prevented by fairly large and repeated doses of Strychnine and other substances which cause increased Adrenalin output.—Jl. Ph. & Exp. Ther., Apl. '26,228.

A further case of 'Inecto' poisoning. In spite of proved negligence of user to study instructions and apply the test, she was awarded £500 plus a further sum agreed as special damages.—L. i./26,1058.

The synthetic hair dyes, prepared on a base of Paraphenylenediamine are so noxious that nearly every European country, in addition to New York, forbids their use.—L. ii./27,824.

The Victoria Pharmacy Board (Australia) has added Paraphenylenediamine and similar irritant bases, preparations and admixtures to Part II. of the Second Schedule of the Poisons Act.—P.J. i./27,373.

Dyed Furs.—Fur workers and wearers of dyed fur are liable to be affected with dermatitis from this substance. Investigations in Copenhagen show that Paraphenylenediamine is almost the only dye used, since it has the advantage of being used cold. The fur is dipped in a 0·5% solution and then into Hydrogen Peroxide, when a dark insoluble colouring matter—"Bandrowski's Base"—is formed. The fur is then washed in revolving drums. Complete removal of all unoxidised amine should be made compulsory.—Y.B.P., '24,524. *See also* Metaphenylene-diamine.

Metaphenylene-diamine Hydrochloride. *Syn.* **Lentine:** $C_6H_4(NH_2)_2.HCl$. *Dose.*—⅙ grain once or several times daily. In acute diarrhœa. Adult dose 1½ grain to 3 grains thrice daily. The urine becomes dark coloured. —Gehe, see also Brickdale.

This compound, traced in fur, considered more poisonous than the para-. The fur cut away from the leather yields nil to distilled water, but dilute saline, alkalis, acids and wool fat (if digested some hours), extracted a coloured principle which agreed with metaphenylene-diamine.—H. Skinner quoted by H. C. Semon, B.M.J. i./23,613.

Materials used in dyeing furs are Amino-derivatives of Benzene, Naphthalene, etc. Others are Benzene-derivatives containing Amino- and Oxy-groups. Paraphenylene-diamine is known as 'URSOL.' In its oxidation Chinondichlordi-imine, which is very irritating, is formed. Pyrogallol, and a number of other dyes are used to produce different shades.—B.M.J. i./23,535.

Dermatitis from dyed fur. "Dyed coney" is probably rabbit—probably paraphenylenediamine employed.—H. C. Semon, B.M.J. i./23,467.

METOL poisoning due to the presence of the Methyl derivative of Paraphenylenediamine. Victims of poisoning by phenylenediamines are warned against the use of soap which aggravates the dermatitis. Acetic Acid 50% is advocated as a detergent, and for the relief of the itching bathing the parts in cold water is recommended.—Brit. Jl. Photog., April 13/23,218, per P.J. i./23,386; P.J. i./25,126. See also L. i./26,417, and our Therapeutic Index.

Orthotoluidine.—$C_6H_4CH_3NH_2 = 107{\cdot}08$.

A colourless liquid turning brown on exposure to air and light and otherwise closely resembling Aniline. Sp. Gr 1·0037, B.pt. 199° C. *Soluble* 1 in about 70 of water.

Does not appear to have been used therapeutically.

Acidum Sulphanilicum. $C_6H_4NH_2SO_3H, 2H_2O$ (1 : 4) = 209·162.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**).

In small white crystals, slightly soluble in water. Used in Ehrlich's

Diazo Test, now deleted from this work. Iodism has been treated by 15 grain doses daily of the Acid in 7 ounces of water.

It is analgesic, and is best given as—

Sodii Sulphanilas. $C_6H_4NH_2SO_3Na, 2H_2O=231·149$.

Dose.—5 to 15 grains (**0·3 to 1·0 Gm.**).

In white shining scales, easily soluble in water. Useful in acute catarrh, laryngitis, and otitis. Said to convert the harmful nitrites in saliva and nasal mucus into innocuous diazo bodies.

Ferri Sulphanilas. $(C_6H_4.NH_2.SO_3)_3Fe=572·2$.

Iron Sulphanilate was introduced under the name ✱**Ferrivine** (T.M. 371090) or "IRON TRI-*p*-AMINO-BENZENE SULPHONATE."

It is not now used medicinally to any extent.

Zinci Sulphanilas. *Syn.* ✱NIZIN. (T.M. 287163).
$(C_6H_4NH_2.SO_3)_2Zn.=409·62$.

White crystals soluble 1 in 7 water, 1 in 250 Alcohol 90% (by our experiments). Solutions 1 in 500 to 1 in 250 are injected in the acute stage of gonorrhœa. In atrophic rhinitis the nasal fossæ may be packed with gauze dipped in 1 to 2% solution.

Anthrarobin. $C_6H_4C(OH)CH.C_6H_2(OH)_2=226·08$.

A light brownish powder, darkening with age, obtained from alizarin by reduction. A powerful deoxidising agent, soluble in weak alkaline solutions. 10% ointment in psoriasis, etc.

Benzol. FR. CX.—'Benzine.' (Avoid this way of spelling for this body.—W.H.M.) *Syn.* BENZENE (*B.P.* '14). $C_6H_6=78·048$.

Dose.—5 to 10 minims (**0·3 to 0·6 Cc.**), in capsule or oily solution.

A mixture of homologous hydrocarbons obtained from light coal tar oil. Sp. Gr. 0·880 to 0·887.

Antidotes.—See Poisons and Antidotes.

When swallowed it usually produces a sensation of burning in the stomach. It is a narcotic which, when swallowed or inhaled, produces vertigo, delirium and tonic convulsions, followed by deep sleep; 30 Cc. has proved fatal.

Uses.—For cough, and whooping-cough, and in influenza. It quickly destroys pediculi capitis or pubis, applied freely; one application sufficient.—For seborrhœa, should be brushed on the skin.

It has also been somewhat extensively tried in leukæmia.

It has preservative action on organic matter, *e.g.*, 2 drops preserved 8 ounces of Infusion of Gentian several days in an open vessel.

This body is entirely distinct from **Petroleum Benzine** or **Benzoline,** obtained in the fractionation of the hydrocarbons in Shale. Petroleum Ether and Petroleum Benzine are used for heating cauteries for nævi, &c.

Benzol is not suitable for this purpose—it burns with a smoky flame. It is, however, better for removing grease stains.

A test for it is to drop into a sample a few grains of Dragon's Blood. If the genuine article it is at once coloured; if it be the Petroleum article, scarcely any effect.

Michael Faraday discovered the body in the liquid of coal gas cylinders (as then used) calling it Bicarburet of Hydrogen $C_{12}H_6$. It was renamed Benzole by him and Benzine by the French (who still adhere to the term—*vide* FR. CX.). Benzole would be the best name for this body (' ol ' being retained for Alcohols) Benzine, or better BENZIN, being kept for the petroleum distillate.

Benzol Capsules contain 5, 10 and 15 minims diluted with ½ volume of Olive Oil, also **Benzol 'Formagules'** same strength.

Leukæmia has been treated by large doses, *e.g.*, 3 to 4 Gm. (45 to 60 minims approx.).

A case of spleno-medullary leukæmia treated with doses ranging from 30 to 90 minims daily markedly improved. White cells dropped from 133,000 to 7,100 with corresponding increase in red from 2,400,000 to 4,175,000 also increase in Hæmoglobin from 40% to 75%. Nodular lympathic leukæmia treated with similar results but terminated fatally, likewise a case of lymphosarcoma. The question arises as to whether the improvement is permanent.—T. G. Moorhead, B.M.J. i./15,410.

A number of similar accounts have appeared. It would be well to treat cases with small doses at first and to note toleration or otherwise. Simultaneously do blood counts.

We know of a case of lymphatic leukæmia which has been markedly improved by 15 m. Capsules with Olive Oil. Leucocyte count markedly reduced in a fortnight. As much as 2 drachms *per diem* of Benzol were taken.

Experiments on animals have shown that chemically pure Benzol is distinctly more poisonous than the crude variety in use in the rubber industry.—P.J. i./23,324.

Benzol poisoning as an industrial hazard: 15 fatalities and 83 cases of sickness in U.S.A. prior to 1925, and 7 fatalities during first 9 months of 1925.—L. ii./26,558.

Chronic Benzol poisoning takes the form of aplastic anæmia when small quantities of Benzol are inhaled over a prolonged period.—L. ii./27,289.

National Association's Specification for Motors. Sp. Gr. 0·885. Sulphur not exceeding 0·4%. Distillation tests.—B.M.J. i./19,251.

Benzoyl Chloride. $C_6H_5.COCl$ = 140·497. Prepared from Phosphorus Pentachloride and Benzoic Acid. Distils between 190° C., and 200° C., Sp. Gr. 1·218. Distinguish from **Monochlorbenzene** (*Syn.* **Benzol Chloride**), C_6H_5Cl = 112·497, Sp. Gr. 1·106, B.Pt. 132° C., and **Benzyl Chloride** $C_6H_5CH_2Cl$ = 126·513, Sp. Gr. 1·106, B.Pt. 178° C.; also **Benzal Chloride**, *Syn.* **Benzylidene Chloride** or **Benzyl Dichloride**, $C_6H_5CHCl_2$ = 160.962, Sp. Gr. 1·288, B.Pt. 206° C.

Benzyl and Benzylidene Chloride and homologues and substitution compounds, Patent 134,250, see J.C.S.A. i./20,21.

Para-dichlor-benzol ($C_6H_4Cl_2$ = 146·946) 92%, Soap 3%, Paraffin Wax 3%, Cedar Wood Oil 2%, for wood-beetle killing. Used in Westminster Hall.—From the "Times."

Paradichlorbenzol, sold as Globol or Chloryl, when vaporised, is effective for killing lice in clothing.—P.J. ii./26,715.

Ortho-dichlor-benzol has also been used as wood preservative.

Nitrobenzol $C_6H_5NO_2$=123·048, 'Oil of Mirbane,' has an odour similar to Benzaldehyde, and is used in cheap perfumery; it is a dangerous poison if used in sweetmeats.

Copper sulphate given as emetic; further treatment: Calomel and Bismuth. Recovery.—L. i./06,1242. Fatal dose is about 1 Gm. Boot blacking caused poisoning.—L. ii./04,1439. Poisoning by—placed on cotton wool for toothache. Recovery under 0·2 Gm. Caffeine hypodermically.—B.M.J. i./12,183.

Fatal poisoning by Nitrobenzene (Oil of Mirbane).—D. R. Thomas, I.M.G., May, '26,229.

Antidote.—Strychnine hypodermically and stimulants.

Nitrobenzol can be reduced electrolytically to **Azoxybenzol** $C_6H_5N:O:NC_6H_5$ = 218·096; **Azobenzol** $C_6H_5N:N.C_6H_5$ = 192·096; **Hydrazobenzol**, $C_6H_5NH.NHC_6H_5$ = 194·112; and Aniline $C_6H_5NH_2$. Preferable to chemical means.—P.J. i./16,3.

Dinitrobenzol, $C_6H_4(NO_2)_2$ = 168·048. The *meta* compound is formed by treating Benzol with a mixture of equal vols. fuming Nitric Acid and Concentrated Sulphuric Acid, and has melting point 90° C. The *ortho-* body has melting point 117° C. *Para-*, 172° C.

Trinitrobenzol. $C_6H_3(NO_2)_3(1:3:5)$ = 213·048. Crystalline leaflets melting at 121° C.

Manufacture.—Heat Meta-dinitrobenzol 60 with fuming sulphuric acid 1,000 and Nitric Acid (Sp. Gr. 1·52) 500, for a day at 100° C. and for 4 days at 110° C. The yield depends a good deal on the length of heating and other conditions. We found this method (Beilstein Erg. 3 Aufl. ii. p. 49) to work better than that given in Watts. The Trinitro body is separated by pouring the reaction mixture into water (5 or 6 vols.).

Benzyl Alcohol. $C_6H_5.CH_2.OH$ = 168·089.

Dose.—5 to 40 minims (**0·3 to 2·5 Cc.**) in water three or four times a day.

A liquid with a slight aromatic odour.

Is a satisfactory local anæsthetic, preferably used mixed with Chloroform. A few drops applied to exposed nerve or cavity is an efficient anodyne for toothache. It is 40 times less toxic than Cocaine.—Chem. News, Feb. 25th, 1921.

In common with the other Benzyl derivatives this parent Alcohol has been found by Macht to be useful in excessive intestinal peristalsis, pylorospasm, and conditions of the nature of persistent hiccough, as also in whooping-cough. It is stated that the addition of 1% to 5% of Benzaldehyde improves efficacy.—C. & D. Nov. 1920,1629.

Benzyl Benzoate. *Syn.* ***Spasmodin** (T.M. 398016). (***Spasmodine** is T.M. 397417). $C_6H_5CO.O.C_7H_7$ = 212.086.

Dose.—10 to 30 minims (**0·6 to 2 Cc.**) of 1 in 5 Alcoholic Solution in water or as *emulsion, vide* below.

A liquid with aromatic odour, Sp. Gr. 1·1 as occurring in commerce.

The pure substance is in white crystals melting at 20° C. (Fluid at 19° C.). The preparation of commerce is physiologically pure, but cannot be guaranteed 100%—the difference would be Benzyl Alcohol.

Manufacture.—From Benzyl Alcohol and Benzoyl Chloride (Kraut, Ann. 152,130). Also by heating Benzaldehyde at 100° several days with a small quantity of Sodium Benzylate.

The following has been stated to give a yield of 70 *to* 75% *of theory* :—

A mixture of finely powdered, desiccated sodium benzoate and a slight excess of benzyl chloride is heated on an oil bath at 170° to 175° for about 24 hours, the mass being frequently stirred. The mixture is allowed to cool, whereupon it is first shaken up with water and then sufficient sodium carbonate added to produce an alkaline reaction. The benzyl benzoate, which separates as an oily liquid, is removed by decantation and distilled *in vacuo* to remove the excess of benzyl chloride. After rectification the pure product boils at 196°, at a pressure of 25 mm.—C. D., Mar. 31/23, p. 438.

Uses.—It is practically non-toxic and has been used in excessive intestinal peristalsis, diarrhœas and dysentery, intestinal biliary and renal colic, spastic constipation, vesical spasm, uterine colic, arterial spasm and bronchial spasm of true asthma. Might be of service in dysmenorrhœa.

Capsules of Benzyl Benzoate contain 3 and 5 minims.

Emulsion of Benzyl Benzoate.

Dose.—½ to 2 drachms (**2 to 8 Cc.**) every two hours as required.

Benzyl Benzoate 1, Mucilage of Acacia 15, Aromatic Elixir to 40.

WHOOPING COUGH is well treated by Benzyl Benzoate.—D. Macht, L. ii./20,615, but its action is uncertain.—L. i./21,394.

SPASTIC CONSTIPATION. It should be given intramuscularly, *e.g.* diluted with Olive Oil. Adult dose 20 minims. For children *pro rata* by Young's table.—L. i./21,394.

PERSISTENT HICCOUGH. Highly spoken of. Twenty to 30 drops of the 20% Alcohol Solution, in milk or water.—L. ii./20,512.

LYMPHATIC LEUKÆMIA has been treated with it. It is harmless in comparison with Benzol. *Dose.*—5 drops *t.d.*—Pres. Nov. '19.

Vasodilator action of Benzyl Benzoate and Acetate.—B.M.J.E., ii./26,89. It was found that Papaverine, which is probably a Tetra-methoxy-benzyl Isoquinoline, had the effect of inhibiting contractions of the ureters and lowering the tonus of plain muscle, whilst the Pyridine Phenanthrene group represented by Morphine was found to stimulate contraction and increase tonicity. Benzyl esters were therefore examined and found to act on smooth muscle of the viscera in a similar way to the first mentioned alkaloid—the benzoate being finally selected for use.

Benzyl Acetate. $CH_3CO.O.C_7H_7 = 150{\cdot}08$.

Oily fluid smelling of pears, made from Benzyl Alcohol, Acetic Acid and Sulphuric Acid or by boiling Benzyl Chloride with Alcoholic Potassium Acetate. Formed also by boiling a mixture of Benzoic Aldehyde and Glacial Acetic Acid with zinc dust.—(Watts.).

Benzyl Acetyl - Salicylate $C_6H_4O.CH_3CO.COO.C_7H_7 = 270{\cdot}112$ appeared to be the most powerful intestinal relaxant of twelve Benzyl Esters tested. They all produced relaxation of the intestinal muscles, lowered blood pressure and depressed respiration similarly to Benzyl Benzoate.—Nielsen and Higgins, Jl. Lab. and Clin. Med. St. Louis, Nov. 1921, per P.J. i./22,47.

Benzyl Succinate. *Syn.* *SPASMINE (T.M. 421401) $C_{18}H_{18}O_4 = 298{\cdot}144$. *Dose.*—5 to 15 grains (**0·3 to 1 Gm.**).

This is a tasteless crystalline substance. Not nauseating to the stomach. It is employed for conditions similar to those for which the Benzoate has been given. **Esterol-Stearns** is a special brand.

Capsules of Benzyl Succinate 5 grains with **Papaverine Sulphate** ½ grain are prepared for the combined effect of these bodies.

Cinnoxyl Capsules are stated to contain **Benzyl Cinnamate** $C_9H_7O_2.C_7H_7 = 238{\cdot}117$, and Cholesterin.

Benzylcarbinol, *Syn.* β-phenyl-ethylol. $C_6H_5.CH_2.CH_2OH$. **'Rose Oil'** or **'Orange Oil.'**

A local anæsthetic thought to be superior to Benzyl Alcohol. Toxicity about the same as that of the latter. It is sufficiently soluble for therapeutic use.—A. M. Hjort & J. T. Eagan, Jl. Pharm. & Exp. Therap., Nov., 1919.

Toluol (**Methyl-Benzol**) $C_6H_5CH_3 = 92{\cdot}064$ and **Xylol** (**Dimethyl-Benzol**) $C_6H_4CH_3CH_3 = 106{\cdot}08$ have chemical and physical properties allied to Benzol. The 1 : 2 Xylol boils at 141°, 1 : 3 Xylol boils at 139°, 1 : 4 Xylol boils at 138°.

Xylol. *Syn.* **Xylene,** unless otherwise specified, is a mixture of the three modifications. In *dose* of 5 to 15 minims in capsule rendered less likely to dissolve in the stomach juice than in the intestines; has been employed in respiratory affections and in dyspepsia, and has also been suggested for use in certain skin diseases.

A small quantity of Toluol added to a fresh vegetable infusion has a remarkable preservative action as Benzol above. As **solvent naphtha**, a mixture of toluol and xylol—obtained in distilling coal-tar—is used on a commercial scale as a solvent for indiarubber. Agitation for days of the finely comminuted material with the solvent is needed. (Solvent Naphtha commercially may now be of much higher B. pt. *cf.* Mineral Naphtha.).

Scarlet Colors.

Biebrich Scarlet R Medicinal. *Syn.* *o*-Toluene-azo-*o*-toluene-azo-β-naphthol. $C_7H_7N_2.C_7H_6N_2.C_{10}H_6OH$.

Soluble in oils and fats, insoluble in water.

Uses.—To regenerate skin and to hasten epitheliation. As ointment, 2 to 8% Scarlet has been much employed.

Aurinaria of Scarlet 5% strength are for aural treatment.

Unguentum Scarlet 2 to 8%, or as required, in Unguentum Lanolini; also in Yellow Soft Paraffin. Prescribers should specify which is desired.

Ⓟ**Oleum Scarlet et Atropinæ.**—Corneal ulcers have been treated by a 5% suspension in castor oil containing 1% atropine. —P. J. Hay.

There has been some confusion regarding the nomenclature and constitution of the Scarlet R dyes, and the above *Medicinal* Biebrich should always be specified.

The following Scarlet colours have been similarly employed.

Cerasine Red. *Syn.* BENZENE-AZO-BENZENE-AZO-β-NAPHTHOL.

This is also insoluble in water, moderately in Alcohol, and very soluble in Chloroform and Ether (by our experiments), and has been found quite satisfactory.

Non-Staining Scarlet. *Syn.* *o*-AMINO-AZO-TOLUENE.

Soluble in oils and fats, insoluble in water. Considered by some to be more efficacious than Scarlet R.

'Ordinary' Biebrich Scarlet is the *Sodium salt* of *p*-sulpho-benzene-azo-*o*-sulphobenzene-azo-β-naphthol, soluble in water making an orange-red solution.

References to Treatment with Scarlet Ointment.

Old ulcers markedly improve. The ointment should not be left on more than 48 hours, or marked irritation may occur. In corneal ulcers, favourably reported on.—Pres. Jan. 1911, p. 4.

Ulcers, 80 cases. In the majority it was given for intertrigo of the ear, or of the napkin area, and seemed to improve in even 24 hours.—L. ii./11,1043.

Should not be used on fresh wounds, and in granulating wounds only a thin layer of ointment should be applied on the edges.—H. M. Lyle, Med. Rev. Nov. 16/12, per Pres. Feb. 1913.

In rodent ulcer 2% Scarlet Ointment efficacious after Carbon Dioxide and removal of the eye.—Pres. Nov. 1912,299.

In traumatic corneal abrasions and corneal ulcers a 1% ointment with Vaseline, or Vaseline and Lanolin equal parts, successful. For granulating postaural wounds in acute mastoid disease a 2 to 4% ointment on gauze or lint used with good results.—F. Allan on Value of Scarlet, Ther. Gaz., Jan. 1913, p. 1.

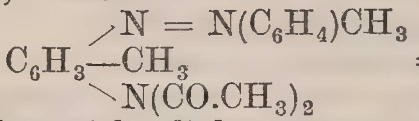
Headache, giddiness, intense epigastric pain and vomiting following use of Scarlet Ointment (8%). 6% found satisfactory.—L. ii./12,1678.

Action of Scarlet upon 'X' rayed skin. In old 'X' rayed skin (2 to 15 months previously) of the rabbit's ear the injection of a solution of Scarlet Red is followed by epithelial proliferation which may reach an extreme degree provided the destructive effect of the 'X' radiation has not been excessive. A marked tendency to sloughing is seen when the dye is injected into old 'X' rayed tissues,—the tendency being greater the more marked the extent to which the appendages of the skin have been destroyed.—J O. W. Barratt. L. i /13,454.

Biebrich Scarlet 5, Hard Paraffin 12·5, Soft Paraffin 82·5 suggested. The basis should be of consistence that the ointment will just come away cleanly with the dressing and yet not too hard for perfect contact.—P.J. i./17,268.

As a contrast stain in histology after use of Hæmatoxylin or Methylene Blue to define nuclei of cells. 1% aqueous solution of Biebrich Scarlet for 2 to 5 minutes is useful. Does not overstain or discharge colour of the nuclei. —A. K. Gordon, B.M.J. i./17,828.

***Pellidol.** (T.M. 342061). *Syn.* DIACETYL-AMINO-AZO-TOLUOL. P.G. VI., P. Svec. X.



$$C_6H_3\begin{cases} N = N(C_6H_4)CH_3 \\ CH_3 \\ N(CO.CH_3)_2 \end{cases} = 309{\cdot}176$$

Red powder with slight acetous odour. Insoluble in water, soluble in Alcohol, Ether or Chloroform, also in oils, fats, and soft Paraffin (' Vaseline ' P.G. VI.).

Used in 2% Vaseline salve—does not stain. Azodermin, the monacetyl derivative and the Aminoazotoluol have also been used for promoting the growth of skin on wounds.

Bordeaux Bx is the Sodium salt of Xylol-azo-Xylol-azo-Beta-naphthol-Beta-monosulphonic Acid: soluble in water.

Bayer '205.' *Syn.* ***Germanin** (T.M. 446358). This compound is probably a derivative of the type :—

$$\left[(SO_3H)_2.\ OH.\ C_{10}H_4NH.\ CO.\ C_6H_4\ NH.\ CO.\ C_6H_4.\ NH\right]^2 CO$$

Dose.—The injection is best made intravenously in dose of 1 Gm. in 10 Cc. of water at a time, but may also be given with safety subcutaneously.

The compound is a white powder, freely soluble in water. The solution can be sterilised.

A series of dyes containing Amino-naphthalene-sulphonic Acid was found to have active trypanocidal properties. A single dose of 3 mgr. is stated to produce immunity in a mouse to trypanosomiasis for weeks or months.

Therapeutically it has been successful where Antimony, Arsenic and Emetine have failed. In a case recorded, four doses, making a total of 3·5 Gm., were given.

Germany appreciates the value of pharmacological research—we do not. A compound like this is thought by the Germans to be the key to tropical Africa, and consequently to all the colonies. —B.M.J. ii./22,569.

The compound exerts a remarkable action on *T. brucei*, *T. equinum*, *T. rhodesiense*, *T. gambiense*, but has not the same effect on *T. lewisi* or *T. cruzi*.

From experiments, the ratio of the minimal therapeutic dose to the minimal tolerated dose was found to be 1 : 60. It was possible to give as much as 0·5 Gm. per kilo body weight without causing death of mice (infected with *T. equiperdum*). It would, hence, be safe to assume 0·36 Gm. would be easily tolerated by man. Details of nine cases of trypanosomiasis treated. As much as 12 Gm. within 14 days have been given intravenously. Seven of the cases apparently cured.—G. C. Low and P. Manson-Bahr, L. ii./22,1265.

It is stated to have a direct action on trypanosomes, whether given subcutaneously, intravenously or *per os*; also that it has prophylactic power. —Mayer and Zeiss, quoted, L. ii./21,573.

The substance has a drawback. It is energetic on the kidneys. Whether the damage is permanent is not yet known, but life with kidney impairment is thought preferable to death from trypanosomiasis.—H. H. Dale, B.M.J. i./22,807; L. i./22,1010.

It was found that the dye becomes attached to the proteins in the blood serum, especially to the albumins; albumin-free 'ultra-filtrate' from the serum was found devoid of the remedy. It is excreted unchanged in the urine.—Leader, L. ii./22,1286.

Therapia Sterilisans Magna, though desirable, is probably as unattainable in human trypanosomiasis as in syphilis. The best effect seemed to be obtained by giving the first 3 injections at close intervals, and spacing out the remainder into 1 Gm. doses once a week. The effects on the kidneys need not be regarded as contraindicating its further use.—P. Manson-Bahr. Records of nine cases of trypanosomiasis in Europeans treated with Bayer '205.'—G. C. Low, B.M.J. i./23,149.

As much as 5 Gm. have been given intravenously in 50 hours to a native. —N. H. Dyce Sharp (West African Med. Service), L. i./23,1026.

Six cases of trypanosomiasis in man treated by F. W. Kleine and W. Fischer.

If given in smaller doses than 1 to 1·5 Gm. the organisms may lose their susceptibility to the drug.—B.M.J. i./23,36. See also J. W. Stephens and Warrington Yorke, Jl. Trop. Med., Feb. 15/23,65.

We have observed conflicting statements of the action of Bayer '205' on trypanosomes *in vitro*. One writer records no marked harmful action, whereas another states that after subjection to the drug for 1½ hours trypanosomes no longer produce infection. The action of the drug *in vivo* is to prevent reproduction.—*cf.* T.D.B., 17/21,334,335.

It has a chemotherapeutic index 1 : 60 (Atoxyl 1 : 2). It is probably a derivative of Naphthylamine-Sulphonic Acid.—Barger, per Pres. Apl., '23,155. See also L. ii./26,28.

Successful in trypanosomiasis and has been tried in general paralysis.— W. Yorke, L. i./26,427.

Bayer '205' and Atoxyl do not cure trypanosomiasis when it has reached the second stage. 0·05 Gm. intrarachidianly may cause grave accidents and 0·3 Gm. mortal accidents. Cutaneous eruption noticed and renal irritation sometimes ending in nephritis.—per Jl. Trop. Med., Jan. 15, '25,36.

Not found superior to other drugs in use for human infection by *T. gambiense*. Albuminuria caused may lead to death from uræmia.—L. i./25,892.

Treatment in South Africa not altogether satisfactory but prophylactically encouraging.—L. ii./25,1246.

Superior to drugs previously tried, but it cannot yet be considered a cure for late cases. Tryparsamide almost equal, and easier to work.—A. T. Schofield, B.M.J. i./26,92.

Animals rendered more resistant to trypanosome infection if treated with a mixture of *trypanosomes suspended in Bayer* '205.' Acquired resistance not attributed to protective action of drug. It combines in some way with the trypanosome cell producing a heterogenic antigen capable of stimulating formation of specific antibodies.—per Jl. Trop. Med., Sept. 15, '26,324.

Emetine better in treatment of animal trypanosomiasis.—per Jl. Trop. Med., May 1, '26,143.

It may be better for infections with *T. Rhodesiense* than for *T. Gambiense*. Of value for early hæmic infections where trypanosomes become fast to Arsenical or Antimonial preparations.—P. Manson-Bahr, L. i./27,132.

KALA-AZAR treated with success; dose gradually increased up to 1 Gm.— no ill effect. Mollow's case (1922) in which 0·2 Gm. was disastrous is referred to.—Warrington Yorke, B.M.J. i./23,370. Two fatal cases.—J. T. Duncan and P. H. Manson-Bahr, Trans. Roy. Soc. Trop. Med., Vol. 17, 400. A failure —L. E. Napier, per Jl. Trop. Med. Nov. 15/23,348.

FILARIASIS. Painful local reaction occurred in one case, as result of escape of small quantity into subcutaneous tissues. In another 2 Gm. gave violent reaction. It causes a sharp initial rise in the number of embryos circulating in the blood, followed by a pronounced temporary fall. No evidence of permanent damage to the kidney.—F. G. Rose, Int. Conf. Trop. Am., '24,257-270.

Afridol Violet. Relationship to Bayer 205.—G. M. Dyson, P.J. i./26,103.

"**No. 309,**" produced in France, has similar properties and trypanocidal action, and is probably identical chemically. According to description the product should be $[C_{10}H_4(SO_3Na)_3NH.CO.C_6H_3.(CH_3)NH.CO.C_6H_4.NH]_2CO$.—C.D. Mar. 29/24,451.

TRYPANOSOMIASIS.—"No. 309" like "205" proved inferior to Arsenics. Peripheral sterilisation easily obtained but of short duration. Causes albuminuria in most cases. Preventive action good: prophylactic action in man not yet proved.—per Jl. Trop. Med., Sept. 15,'26,344.

SUP. 36.—*Dose.*—1/12 to 1/3 grain (0·005 to 0·02 Gm.) intravenously or intramuscularly.

The symmetrical UREA OF *p*-BENZOYL-*p*-AMINO-BENZOYL-1-AMINO-8-NAPHTHOL-3-6-SODIUM SULPHONATE.

In acute staphylococcic infections, in non-metallic intoxications, in pulmonary thrombosis and œdema, venous thrombosis and the pernicious vomiting of pregnancy. Its action is thought to depend on "liberation of + charged and conductor-functioning Sodium atoms" from the 6-positions. In the treatment of colds in the head, hay fever, influenza, acute asthma, and other inflammatory conditions of the lungs.

SUP. 468.—*Dose.*—1/60 to 1/20 grain (0·001 to 0·003 Gm.) intramuscularly. A similar compound used in septicæmia.

SUM. 36.—*Dose.*—1/30 to 1/6 grain (0·002 to 0·01 Gm.) intramuscularly every 5th day on two or three occasions.

Also allied to SUP. 36, used in infections caused by gram-negative organisms.

In the treatment of gonococcal infections, such as urethritis, vulvitis and ophthalmia: also in very acute cases of gonococcal arthritis.

SUM. 468 is the symmetrical UREA OF META–BENZOYL–META–AMINO–BENZOYL–1–NAPHTHYLAMINE–4–6–8–SODIUM SULPHONATE.

In malaria, piroplasmosis of horses, and trypanosomiasis of dogs. Fourneau's "No. 309" is allied.—J. E. R. McDonagh, B.M.J., i./25,654; i./26,693.

"T.N.T." Tri-nitro-Toluene, *Syn.* **Trotyl,** $C_6H_2CH_3(NO_2)_3$= 227·064. *See Vol. II.*

Trinitro-Butyl-Toluene $C_6HCH_3C_4H_9(NO_2)_3$ is synthetic Musk or Tonquinol.

Chinolinum. *Syn.* QUINOLINE. C_9H_7N=129·064.

Dose.—3 to 10 minims (**0·2 to 0·6 Cc.**).

A colourless liquid, with peculiar odour, soluble in alcohol, but insoluble in water. Prepared by oxidising a mixture of Aniline and Glycerin with Nitrobenzol (Skraup's Synthesis).

Chinolini Tartras.

$(C_9H_7N)_3,[C_2H_2(OH)_2(COOH)_2]_4$=987·344.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**) in chloroform water, with Syrup of Orange, or in cachet.

Glistening, white acicular crystals, nauseous in taste, and ***soluble*** about 1 in 80 of water. Antiseptic and antipyretic, *e.g.*, in enteric and intermittent fevers, useful in neuralgia.

Oxyquinoline Sulphate. *Syn.* **Superol,** $(C_9H_6N.OH)_2.H_2SO_4$=388·208.

★**Chinosol.** *Dose.*—1 to 5 grains (**0·06 to 0·3 Gm.**).

TRADE MARKS: CHINOSOL NOS. 221896 (Class 2), and 221898 (Class 48), registered in 1899.

PATENT: No. 1409 of 1896, "An Improved Manufacture of an Antiseptic Disinfectant," granted to the owners of the trade mark. The patent ***expired*** in 1909.—per C. D., Aug. 1915.

The above patent deals with the 'heating of Oxyquinoline with Potassium Pyrosulphate.'

The substance was originally stated to be Potassium-oxyquinoline Sulphate but the content of Potassium in the original article of commerce does not agree with theory.

For notes on Manufacture see 17th Edn. p. 306.

Characters and Uses.—Yellow crystalline powder, M. pt. 175 to 177° C, readily *soluble* in water, sparingly in alcohol. A 2% solution checks surface hæmorrhage and for scalds. 1 in 1,000 for the hands. In chronic eczema 1 in 200 combined with Lotio Calaminæ Oleosa.

Tablets 5, 8 and 15 grains. One of the latter in a pint of water is said to be equal to Phenol 1 in 40, as an antiseptic. **Gauze,** 3% 6yd. pieces.

Beneficial effects in many mycoses: tricophytic conditions of face, arms, and wrists cured within a week by repeated applications of 1 in 2,000 solution.—B.M.J.E., i./27,49.

Cyanine Dyes, Sensitol Red, Violet and **Green, etc.,** used as photographic sensitizers, are extraordinarily active against staphylococci. **Sensitol Green,** an iso-cyanine, is made by condensing quinoline methyl iodide with *p*-tolu-quinaldine methiodide.—C. H. Browning and co-workers. B.M.J. i./22, 514,612.

Cyanine. *Syn.* Quinoline Blue, Iodocyanine, is usually given the composition $C_{29}H_{35}N_2I$ or $C_{28}H_{35}N_2I$.

Styryl-quinoline derivatives formed by condensation in presence of piperidine of *p*-dimethylamino-benzaldehyde and quaternary salts of Quinaldine and Lepidine. Substances of this group are powerful antiseptics. —C. H. Browning and co-workers, B.M.J. ii./23,326.

Acidum Phenylcinchoninicum, P.G. VI., U.S. X., Ph. Ned. V., P. Bor. VII. P. Svec. X. *Syn.* Acidum Phenylchinolincarbonicum (P.G.), Cinchophenum. *Phenoquin (T.M. 403708), *Atophan (T.M. 331473), *Agotan (T.M. 401393), Cinchophen, Nylofanol, Quinoline Carboxylic Acid. $C_6H_5.C_9H_5N.COOH$=249·096.

Patent 15,684/12, "Improved process for Manufacture." There are others to which reference should be made, *e.g.*, 12,052/12.

Dose.—8 grains (0·5 **Gm.**) four times daily to 15 grains (**1 Gm.**) thrice daily after meals. Simultaneously on the first day, ½ ounce (**15 Gm.**) and on the following days 75 grains to 150 grains (**5 to 10 Gm.**) of Sodium Bicarbonate, but this is not the invariable practice.

Tablets 4 grains (**0·25 Gm.**)—eight to twelve daily, also 8 grains (**0·5 Gm.**)—four to six daily.

A yellowish cream-coloured amorphous powder of the composition 2-Phenylquinoline-4-Carboxylic Acid.

Uses.—Is said to facilitate the elimination of uric acid from the organism in gout and rheumatic affections, also used in neuralgia and sciatica. It may cause cloudiness and red colour in the urine.

Incompatible with Sodium Bicarbonate and other alkalies *in vitro.* We did not find it incompatible with Potassium Iodide.

Increased excretion of Uric Acid confirmed. Four cases of gout and one of albuminuria treated, the uric acid in urine rose and that of the blood sank. The increased output is due to elimination of accumulated uric acid in the blood, due to kidney inefficiency.—Folin and Lyman, **Jl. Ph. & Exp. Ther.,** 1913,4,539—546) ex J.C.S.A. i./14,115.

In two gouty cases the drug was thought to be much less active with regard to elimination of Uric Acid than in healthy subjects. It had hardly any action in doses of 1 to 2 Gm. Its action is little understood—it probably consists in decomposition of a larger quantity of Nucleoproteids or in som

alteration in those fermentative processes which regulate the oxidation of the purin bases.—L. i./15,1092.

With Aspirin given in influenza the combined effect in inducing perspiration said to be better.—See Aspirin.

JAUNDICE OF THE NEW-BORN disappeared in 12 days in 80% of 67 cases treated with 0·1 Gm. daily (with or without 2 Gm. of sugar).—per Jl. A.M.A., ii./25,860.

Excretion of Uric Acid.

Large doses of alkalies, Hexamine and Piperazine, which dissolve Uric Acid *in vitro*, do not appreciably alter the excretion. Salicylates increase both formation and elimination. The derivatives of Quinoline Carboxylic Acid notably facilitate excretion, shown by a reduction in blood Uric Acid.—Dixon, p. 100.

Toxic effects from Atophan. General malaise, headaches, gastro-intestinal disturbance, urticaria, albuminuria and jaundice, the latter did not clear for several weeks.—C. Worster-Drought, B.M.J. i./23,148. See also *ibid.* ii./26,93, and Geoffrey Evans, ii./26,93. (Severe poisoning going on to jaundice and repeated vomiting whether with or without Sodium Bicarbonate.)

Three cases of toxic jaundice following the administration of Atophan in ordinary doses *per os*. One of these was fatal. Toxic action is probably due to the quinoline nucleus. *Atoquinol* can hardly be regarded as a derivative of Atophan, but both are derivatives of quinoline. Probably this toxic effect only happens where there is defective hepatic function, but possibly there is actual toxic action on the liver.—Sir W. H. Willcox, B.M.J. ii./26,273.

'Ung. Agotan Co.'

Agotan with a rubefacient in ointment form, for use in general, articular and muscular rheumatism, gout, lumbago, sciatica, erythema nodosum, torticollis, pleurodynia, neuritis, urticaria and chilblains. The simultaneous use of Agotan tablets *per os* increases results in the treatment of complaints caused by excess of Uric Acid.

Atophan applied externally as ointment gave good results in chronic rheumatism and lumbago. Must be applied over considerable area of body. —H. Horsters & H. Rothmann, Med. Klin., Apl. 9/26,582, per Pres., Sept., '26,315.

***Atophanyl** (T.M. 434667). A neutral yellowish liquid, containing equal parts of Sodium Atophan and Sodium Salicylate in solution. *The following is based on makers' printed matter*:—

For intravenous injection.—Ampoules of 10 Cc., containing a sterile solution of 7·5 grains of each.

After the injection, the arm should be held above the head for 1 to 2 minutes. Warm the ampoules first. The patient should not undertake undue exertion too soon after the pain has been relieved.

For intramuscular injection.—Ampoules of 5 Cc., containing a sterile solution of 7·5 grains of Sodium Atophan, 7·5 grains Sodium Salicylate, and 0·6 grain Novocaine in distilled water. To be given deeply in the upper external quadrant of the gluteal muscle.

Uses.—Acute rheumatism, chronic and metastatic joint-diseases of various kinds, especially osteo-arthritis, have been treated: and otherwise as Atophan.

In chronic cases, 10—15 injections are given; usually one injection per day for 4 days, followed by an interval of 2—3 days, proves sufficient. It is, however, sometimes necessary to give 2 or 3 injections a day.

Various rheumatic conditions benefited by intravenous use.—B.M.J.E., i./26,90.

Atophan intramuscularly or intravenously in cases with a definite rheumatic diathesis is said to give good results in scleritis, iritis, and iridocyclitis: injections daily or twice daily.—B.M.J.E., i./27,12.

***Neo-Phenoquin.** (T.M. 403739). LITHIUM PHENYL-CINCHONINATE. $C_6H_5C_9H_5N.COOLi=255·028$.

Dose.—From 5 to 15 tablets daily, each tablet containing 0·25 Gm. after meals, followed by a glass of water.

Simultaneous use of Sodium Bicarbonate is sometimes desirable.

Uses.—For elimination of Uric Acid in acute and chronic gout.

Methyl Phenylcinchoninate, Methyl Phenylchinolincarbonate, P.G. VI. *Syn.* NOVATOPHAN, NEOCINCHOPHEN. $C_6H_5.C_9H_5N.COOCH_3=263·112$.

Dose.—8 grains (**0·5 Gm.**) four times daily to 15 grains (**1 Gm.**) thrice daily. Simultaneously on first day ½ ounce (**15 Gm.**), and on the following day 75 to 150 grains (**5 to 10 Gm.**), of Sodium Bicarbonate.

This compound is the Methyl ester of Atophan and is used similarly. It occurs as yellowish tasteless crystals insoluble in water.

***Atoquinol.** (T.M. 440681). The ALLYL ESTER of PHENYLCINCHONINIC ACID.

Dose.—4 to 8 tablets in 24 hours [each tablet contains 4 grains (**0·25 Gm.**)]. They should be administered with a large quantity of liquid.

It forms odourless yellowish crystals, m.pt. 30°, insoluble in water, readily soluble in Ether and oils.

Uses.—This Atophan derivative has analgesic and antipyretic properties and is used similarly in arthritis, gout, neuralgia, sciatica, etc.

It may be applied externally in an ointment (20%).

Atoquinol has been shown to stimulate elimination and inhibit production of Uric Acid.—M.P.C., April 16, '24.

If the urine shows a sediment of Uric Acid or urates, it is advisable to prescribe Sodium Bicarbonate as well.

Renal lithiasis is the only known contraindication.

Toxic Jaundice. Two fatal cases following use of Atoquinol in rheumatoid arthritis.—W. Langdon Brown, B.M.J. ii./26,37, see also *ibid.* 93, and Sir W. H. Willcox, *ibid.* 273, and *Atophan—Toxic Effects.*

Tolysin. *Syn.* PARAMETHYL PHENYL CINCHONINIC ACID ETHYL ESTER.

Dose.—10 to 15 grains (**0·6 to 1 Gm.**) three or four times daily for four to five days. It may be necessary to give 100 grains daily in rheumatic fever.

A yellowish-white crystalline powder, M.Pt. 74° C.

Uses.—An analgesic, antipyretic, and Uric Acid eliminant. Indicated in gout, rheumatism, rheumatic fever, arthritis, neuralgia, neuritis, and sciatica. It does not depress the heart, or injuriously affect the kidneys. 50 Gm. have been given in 8 days without causing untoward symptoms.

Efficient in acute rheumatic fever, complete relief of symptoms being usually obtained after 10 to 16 Gm. 2 Gm. given every 2 hours for 3 doses, followed by 2 Gm. every 4 hours.—H. G. Barbour, E. Lozinsky & C. Clements, Am. Jl. Med. Sci., May '23,708. See also P. J. Hanzlik, R. W. Scott and others, Jl. A.M.A., '21,1728.

Efficacy in arthritis.—Chace, Myers and Killian, Jl. A.M.A., Oct. '21,1236.

Advocated for headaches of nephritis.—A. I. Ringer, Am. Jl. Med. Sci., June, '21,814.

In acute rheumatic fever.—C. W. Chapman, Pr., Jan. '24,41.

Sodium Iodohydroxy-quinoline Sulphonate. *Syn.* ***Yatren** (T.M. 417770), GRISERIN, LORETIN.

Dose.—15 grains (**1 Gm.**) thrice daily.

Manufacture.—From 8-Hydroxyquinoline or the Sulphate (Chinosol) 8-Hydroxyquinoline-5-Sulphonic Acid is prepared by dissolving in Sulphuric

Acid, pouring into water, and allowing to crystallise. On iodising this product, 7-Iodo-8-hydroxy-5-quinoline-sulphonic-acid is formed, which, mixed with 20% of Sodium Bicarbonate, constitutes the preparation. It contains about 28% Iodine and on adding to water the fairly soluble (about 1 in 25) Sodium Sulphonate is obtained.

Uses.—In amœbic dysentery it is employed *per os* and by rectal lavage.

In acute and chronic amœbic dysentery the above dose three or four times daily for a week, repeated on two or three days during two following weeks; or a daily enema of 200 Cc. of 2% solution—fluid must be retained as long as possible. Local rectal application in resistant chronic cases used with excellent results.—Prof. P. Mühlens, Int. Conf. Trop. Am., '24,335.

A dose three times daily for a week, then an interval of 8 or 10 days, and repeat—in resistant cases supplement with nightly lavage for 6 or 8 nights, repeated after 3 to 6 days' interval (during days when lavage suspended, continue treatment *per os*, giving 0·75 to 1 Gm. daily). Lavage should be retained all night if possible. Of value in acute cases of amœbic dysentery, and good in chronic cases (but duration of effect not known); where complicated with liver abscess the intestinal lesion is ameliorated but not the abscess. In amœbic dysentery with lesions high up in the intestines lavage is useless, but oral method of value.—Louis Schwartz, "Contribution à l'étude du traitement de la dysenterie amibienne par le Yatrène 105," Paris, 1927.

Amœbic dysentery treated with 1 Gm.*t.d.*, also by lavage with 200 Cc. of 5%.—Jl. Trop. Med. Aug. 15/23,267.

Yatren, by enema, acts rapidly in the acute stage, amœbæ being apparently destroyed in 4 days.—P. H. Manson-Bahr and R. M. Morris, L. ii./25,544.

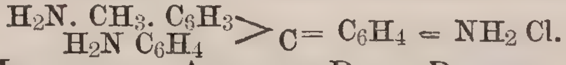
Amœbic dysentery—investigations into the life history of *E. histolytica*. Recent advances in treatment with Yatren.—P. Manson Bahr, B.M.J. ii./27, 486-490.

Some favourable reports are tabulated in the Pres., Jan. '27,15.

The action of certain alleged intestinal antiseptics (Yatren, Kerol, Dimol, Izal). Experiments showed '*no evident action whatever in any dilution employed.*'—L. P. Garrod, B.M.J. i./26,367, see also our abst. under Dimol.

Yatren-Casein Ampoules for intramuscular and in rare cases intravenous injection are made. 'Weak' 2½% Yatren plus 2½% Casein, 'strong' 2½% Yatren plus 5% Casein. Doses ranging from 1 to 7 Cc. are used in bronchitis, acute articular rheumatism, and eye affections.

Fuchsine.—**Rosaniline Mono-Hydrochloride** (principally).



$$\left.\begin{matrix}H_2N.\ CH_3.\ C_6H_3\\ H_2N\ C_6H_4\end{matrix}\right> C = C_6H_4 = NH_2\,Cl.$$

Syn. MAGENTA; ANILINE RED, RUBINE, HARMALIN.

Dose.—½ to 4 grains (**0·03 to 0·25 Gm.**), in a pill.

Iridescent crystals, forming a deep-red solution for staining *B. tuberculosis.*—*Vide* Clinical and Bacteriological Notes, *Vol. II.*

Soluble in alcohol 1 in 8.

Given in renal albuminuria. Must be arsenic-free.

Unguentum Fuchsin 5% in Soft Paraffin. Carbuncle and soft chancre well treated.—L. i./14,1502.

Rosaniline (*Syn.* **Roseine**) **Acetate.**

$C_{20}H_{19}N_3.\ C_2H_4O_2+5H_2O=451{\cdot}288.$

Dark red crystals ***soluble*** in water and in alcohol. Both these bodies are sometimes called 'Roseine.'

Methyl Violet. *Syn.* **Pyoktanin.** In green crystalline powder, *soluble* 1 in 20 of water, 1 in 20 of alcohol 90%, also in Glycerin 1 in 15, and in Oleic Acid. Insoluble in Liquid Paraffin and Vaseline—by our experiments. Commercial Methyl Violet, the colour used in the manufacture of inks, is a mixture of the tetra-, penta- and hexa-Methyl derivatives of Pararosaniline

Hydrochloride. It may be added that there are numerous Methyl Violets, the particular shade depending on the degree of methylation.

Dilute solutions have been injected locally and applied for malignant growths, but Gentian Violet, a purified Methyl Violet, is now generally used. For details of ***antiseptic action*** see under ***Brilliant Green.***

Gentian Violet, Medicinal.

Dose.—0·003 to 0·007 Gm. per kilo [=3 to 7 grains (**0·2 to 0·45 Gm.**) for a 10-stone man] intravenously in a ¼ to 1% aqueous solution.

Chemical Composition.—The product used therapeutically is a purified Methyl Violet, and consists of a mixture of the hydrochlorides of hexa- and penta-methyl-pararosaniline with some tetramethyl-pararosaniline hydrochloride.

It has been suggested that **Crystal Violet,** the pure hexa-methyl derivative, should be used instead of Gentian Violet.—Pres., Nov. '24,393. But this seems hardly requisite in the light of recent results.

Soluble in water, but solutions cannot be made in Normal Saline, as the presence of the electrolyte results in precipitation of the dye.

Adulteration.—The main issue, especially for intravenous injection, is in our opinion that the dye should be free from metals and Dextrin. As a fact, Gentian Violet of commerce contains, according to the 'COLOR INDEX,' and other authorities, 50% of Dextrin.

Examination.—The dye must be carefully examined for 'Heavy Metals," especially Lead, Copper, Zinc, Iron and Arsenic: we suggest as limit for the last mentioned 1 in 100,000. Dextrin content should not exceed 1%.

Ash we advise should not exceed 0·5 to 1%. We have recently had occasion to reject samples which were quite unfit for use in these particulars.

Grübler's Gentian Violet found to consist of about equal parts of Dextrin and dye. Dye was a mixture of chiefly hexa- and penta-methyl-*p*-rosaniline hydrochlorides.—Chem. Absts., 1920,190.

Bactericidal Action.—The dye is stated to be specific for the Gram + group of organisms only.—Jl. A.M.A., Dec. 29, '23.

Staphylococcic infections only are attacked by Gentian Violet, not streptococcal.—E. L. Walker, Jl. Pharm. & Exp. Therap., XXVI., No. 6, 461.

Uses.—It is employed intravenously in septicæmia and endocarditis. Has been tried in encephalitis.

STAPHYLOCOCCAL SEPTICÆMIA has been treated. A dilution of 1 in a million will inhibit the growth of Staphylococci. In a case of staphylococcal septicæmia in an infant 15 months old, 3 injections of a 0·25% aqueous solution were given at 24 hour intervals. First dose 5 mgr. per kilo of body weight. As the white cell count was reduced, the second and third doses were 3 mgr. per kilo. Blood cultures were sterile as result. The child finally recovered and was discharged from hospital.—D. T. Smith and H. Casparis, Jl.A.M.A., Dec. 29, '23.

Startling results may be obtained, but failures are equally numerous. The cases reported total about 40% definitely improved, 20% possibly improved and 40% unimproved. Used in 1 in 200 solution in water, each Cc. containing 0·005 Gm. of dye, a full dose being 45 Cc. for a 7-stone patient. More concentrated solutions may cause thrombosis. Initial injection of 0·002 Gm. per kilo. Sharp temperature reaction, sometimes a chill, following injection. In favourable cases, following fall in temperature, improvement is marked. Value due to its bacteriostatic action in the blood stream.—W. D. Gatch, H. M. Trusler and J. E. Owen, Jl. A.M.A., Sept. 19/25,894.

In sepsis, when Gram + staphylococci are the sole or predominant etiologic organisms and when bacteria are accessible to blood stream, Gentian Violet intravenously is justifiable, indicated, and most beneficial. May be given in safety in doses varying from 0·003 to 0·007 Gm. per kilo in a 0·25 to 1% solution.—per Jl. A.M.A., July 25/25,306.

Doses of less than 0·003 Gm. per kilo of little, if any, value. Several injections at intervals of one or several days often necessary.—per Jl. A.M.A., Aug. 7/26,442.

The successes are thought to be not due to bactericidal powers, as spontaneous recovery occurs, even in severe cases. Bacteria do not course about in the blood stream for a long time, and actually the time an antibacterial substance has in which to exercise its function must be short, possibly seconds. Bacteriostasis may have played a part in the results reported, as dyes such as Gentian Violet when injected are rapidly carried to certain organs where they remain in concentration for a fairly long time, and possibly at these sites they may have a better chance of exerting bacteriostatic effect.—J. W. Churchman, Jl. A.M.A., ii./25,1849–53.

ENDOCARDITIS.—Review of literature (entirely American) on the subject of intravenous injections of the dye. Details of 7 cases of rheumatic carditis so treated, all children, varying from 5 to 13 years. Dose ranged from 25 to 50 Cc. of a 0·25% solution in sterile tap water (i.e. 0·005 Gm. per kilo). Injections given at weekly intervals. Definitely toxic effects occurred in the case of a 5-year old child. Of 10 cases, 8 were definitely improved. With caution as to dose and type of case, the method is safe and worth further trial in the treatment of blood infections.—William Gunn, L., i./27,127.

Subacute infective endocarditis. Good result with 1 in 500 aqueous solution.—R. H. Major, B.M.J.E., i./25,38.

Malignant endocarditis treated: disappointing. 1% aqueous solution used. Except for intense cyanosis of short duration, no untoward symptoms produced.—Jl. A.M.A., Nov. 13/26,1677.

Recovery in three cases of encephalitis and one of chorea.—per Jl. A.M.A., ii./25,1670.

THRUSH treated with local use of 1% aqueous solution. Apparent cure in one day or less in 50% of cases. Relapses on stopping treatment occasionally to be expected.—Jl. A.M.A., ii./25,901.

In PLAGUE, injections have been suggested, but no data as yet are available.

POST-INFLUENZAL EMPYEMA.—Aspiration and intrapleural instillation of Gentian Violet in concentrations of 1 in 10,000 to 1 in 1,000 were used in treatment. Of 27 cases, 14 recovered without operation.—A.J.Med.Sci., 162/21,397. Chem. Absts., '22,591.

For direct application a solution 1-500 to 1-1000 is recommended: for instillation 1-10,000, and for intravenous injection 5 mgm. per kilo weight, injected in 0·5% solution.—Pres., Nov. '24,393.

Gentian Violet proves selective not only between Gram-positive and Gram-negative organisms, but also as between bacteria and tissue cells. Encouraging results in treatment of acute infections of the joint by lavage and direct medication. Also applied in chest infections.—Jl. A.M.A., Leader, Vol. 78, p. 969.

In the dyes showing the greatest inhibitory action, the Hydrogen atoms in the amino groups are all substituted with alkyl radicals; usually this alkyl radical is the methyl group. Acid dyes or salts of acid or basic dyes are inert. The substitution of a hydroxyl radical for a methyl group decreases the inhibitory power.

If two dyes of opposite selective powers be mixed, the mixture combines the power of both, *e.g.*, Gentian Violet and Acriflavine, act respectively on Gram-positive and Gram-negative organisms, while a mixture of the two is bacteriostatic for both.—Pres. June, '24/240.

PERNICIOUS ANÆMIA.—Gentian Violet *per os*, 5 to 50 Cc. of a 1 in 1,000 solution after meals, or in 1 to 2½ grain capsules or tablets, gave a rise in hemoglobin content and in erythrocyte count, and in some cases amelioration of symptoms. Vomiting, nausea, or diarrhœa may be caused.—Med. Jl. & Rec., '27,9, per Pres., June, '27,225.

Auramine. *Syn.* TETRAMETHYLDIAMINO - DIPHENYL - KETONIMINE HYDROCHLORIDE. $C_{17}H_{22}N_3Cl.H_2O=303·657$.

Dose.—1/3 grain (**0·02 Gm.**) has been given *per os.*

A yellow powder soluble in water. The solution is decomposed on boiling or on long standing in the cold, the imino group of the compound being converted into a Ketone group by hydrolysis, giving the insoluble Michler's Ketone and Ammonium Chloride.

A concentrated stable solution, ✱**Glauramine** (T.M. 440880) in **Glycerin** and **Alcohol**, is, however, obtainable, which is diluted with water immediately before use.

Has been used with success in the surgery of the ear and nose, and for the treatment of skin operations with excellent results and no objectionable side effects. Promising results obtained in animal experiments, and there seems no reason why it should not be used intravenously or in other ways without untoward results.—T. H. Fairbrother and A. Renshaw, Jl. R.S.A., March 16,1923,313. It is not caustic or irritant to the tissues.—B.M.J. ii./24,504.

It is stated that in cases of bone suppuration Auramine is superior to any other antiseptic.—Harry Platt.

ANTHRAX.—The use of Auramine has been suggested. A dilution of 1 in 5,000 prevented growth and rendered sterile even spore cultures of *B. anthracis*. Suggested that Auramine should be used instead of Formalin to inject into and round the pustule, or to swab the cut surface of the wound after excision of pustule. Not caustic or irritant to tissues and might be tried intravenously in 1 in 20,000.—A. Renshaw, B.M.J. ii./24,504.

Intravenous Use.—A dose of 0·01 Gm. of Auramine per kilo was tolerated intravenously in rabbits—see a paper Internal Urinary Antiseptics' under Acriflavine.

Auramine 0·1 Gm. intravenously on the first two days and 30 Cc. of anti-streptococcic serum subcutaneously on the first three days in septicæmic cases.—J. E. R. McDonagh, B.M.J. i./26,693.

Selective Action of Coal Tar Dyes.—As a general rule dyes with any marked action contain one or more *amido groups*. If it has a colloidal state in solution it is not likely to be a strong antiseptic. Experiments on *paramœcia* forms. **Auramine** and **Nile Blue** were very effective in strength —1 in 20,000 against trypanosomes—killed in 15 minutes.

Experiments showed that Auramine killed paramœcia in fifteen minutes at 1 in 20,000, and it was only surpassed in this property by the Meldola blues, but the most powerful of these, Meldola blue D (1 in 80,000, 1 in 160,000), contains Zinc Chloride. They state that Auramine killed twelve organisms (including anthrax) at 1 in 5,000, the culture media containing the bacteria were incubated for 48 hours with varying amounts of the dye and were then sub-cultured to detect sterility. Small gold-fishes, however, lived in a solution of 1 in 20,000 for eighteen hours, whereas in Brilliant Green they died in ninety minutes. In the case of paramoecium it is interesting to note that a 1 in 500 solution of Phenol is necessary to kill in fifteen minutes, as against the 1 in 20,000 of Auramine.—F. H. Fairbrother and A. Renshaw, B.M.J. i./23,314,265; L. i./23,314. *Journ. Soc. Chem. Industry*, May, 1922; *Journ. Roy. Soc. Arts*, Vol. LXXI., Nos. 3668 and 3669, March, 1923.

Our experiments, using recognised methods, indicated a more moderate germicidal power, but 1 in 500 *killed* B. coli *in seven and a half minutes. (For further details see Vol. II.)*

Need of attacking the malaria and sleeping sickness problems on chemotherapeutic research lines.—A. Renshaw, B.M.J., ii./26,857.

Auramine is a constituent of **Auremetine,** *the compound used in amœbic dysentery, v. p.* 537.

Malachite Green. *Syn.* Benzaldehyde Green.

Characters.—This is chemically either the Zinc double chloride or oxalate of Tetra-methyl-di-para-amino-Triphenyl-carbinol: $(C_{23}H_{25}N_2Cl)_3 + 2ZnCl_2 + 2H_2O$ or $(C_{23}H_{24}N_2)_2(C_2H_2O_4)_3$. The former is in green prismatic crystals while the oxalate is in green metallic glistening plates.

Solubility.—The Zinc Double Salt by our experiments is soluble in water 1 in 20, very soluble in Alcohol, in Oleic Acid 1 in 14 (?) in Glycerin 1 in 7 (?), totally insoluble in Liquid Paraffin, Vaseline and Eucalyptol. The Oxalate is also soluble in water and Alcohol.

Uses.—During the war was much employed as an antiseptic wound dressing—especially as spray.

Stains on the hands with Malachite Green are easily removed by rubbing with a little cotton wool soaked in either Alcohol or dilute Hydrochloric Acid or dilute Acetic Acid.

Ⓟ Cheatle's "Green Spray," *Syn.* **Ⓟ Sublimate Malachite Green Solution,** SOLUTIO MALACHITI VIRIDIS ET HYDRARGYRI PERCHLORIDI K.C.H., composed of equal parts of 2% Malachite Green in 80% Alcohol and 2% Mercuric Chloride in 80% Alcohol (the two solutions are best kept separate and mixed as required)—proved satisfactory at Haslar.—W. G. Axford and G. L. Cheatle, B.M.J. i./17,535. The spraying must be thorough and the spirit allowed to evaporate before applying the dressing. *It must not be used to mucous membranes.*

Malachite Green kills *Staphylococcus Aureus* in serum in a dilution of 1 in 2,000, while it kills *B. subtilis* spores in a dilution of 1 in 5,000. Its effect is more marked in the case of Gram + bacteria, the commonest flora of war wounds. When mixed with Mercuric Chloride it does not diminish the effect of the latter.—L. ii./15,165. **Valuable routine results from Malachite Green in naval hospitals.—Med. Res. Committee, B.M.J. i./17,769.**

Brilliant Green. *Syn.* TETRA-ETHYL-DIAMIDO-TRIPHENYL-CARBINOL in form of either Sulphate or Zinc Double Chloride (discovered 1879). In medicine the *Sulphate* $C_{27}H_{34}N_2O_4S$ is to be used.

Characters.—Golden yellow crystals, *soluble* in water and in Normal Saline and in Alcohol, forming a green solution.

Chemical Examination.—Samples on the market which we have examined were mostly the Zinc double salt and probably much of the dye that is sold as Brilliant Green is in reality Malachite Green, the latter being in the form of Oxalate.

Fuse **with fusion mixture to liberate Zinc if present, before employing usual tests.**

Antiseptic Power.—C. H. Browning and his co-workers in their work on the use of Acriflavine (*q.v.*) found this substance to compare very favourably with Acriflavine in antiseptic properties, though the latter is more rapid in action.

Uses.—The dye was much used initially on their recommendation as a substitute for the yellow dye, and is still used, solutions of strength 1 in 1,000 being employed. As a dressing it is painless. These two had the highest "T.C." (*v.* Acriflavine). Brilliant Green differs, however, in that it is not advised to be introduced by injection into closed spaces.

Brilliant Green is almost as strongly bactericidal as Hexamethyl-Violet for *Staphylococcus aureus*, *B. diphtheriæ* or *B. anthracis* (a concentration of 1 in 5 million completely inhibited growth of these organisms on agar, whereas 1 in 250,000 of Mercuric Chloride was required for similar result). Hexamethyl-Violet, however, is so weak in its action on the coli-typhoid group as to render it of little value as an antiseptic against these organisms; whereas Brilliant Green is extremely potent in its action on the coli-typhoid group. Further, even in the presence of serum, Brilliant Green is very actively antiseptic. It is also highly inhibitory towards anaerobes, such as B. malignant œdema.—Browning & Gilmour, Jl. Path. and Bact. (Cambridge), Vol. xviii., p. 144.

The most powerful antiseptic investigated by a standard method using *Streptococcus fæcalis*.—Emery for Med. Res. Com., L. i./16,817; i./17,159.

Internal antisepsis by means of "Sulphate" dyes which contain Sulphuric Acid combined with the Alkyl Amino group.—M. Coplans and A. G. Green, Jl. Ph. & Exp. Ther., Oct. '27,433.

Brilliant Green and Crystal Violet (Hexa or Penta-Methyl Violet or a mixture of these), 1% each in a mixture of rectified spirit and water equal parts used to sterilise the skin.—V. Bonney and C. H. Browning, B.M.J. i./18,562.

Stains on the skin **can be removed with spirit, those on clothes by spirit or washing with soap.**

Brilliant Green Ointment. Brilliant Green 1 or 2% in twice the amount of Alcohol 90% and incorporated with Soft Paraffin.

Epithelial stimulant in various minor injuries and affections, *e.g.*, impetigo, indolent ulcers of various kinds, superficial shell wounds involving only the skin, blisters, etc. Apply on a piece of lint the exact size of the part. Results remarkably good.—R. W. Hodgson-Jones, B.M.J. i./17,455.

Brilliant Green Paste (Hey's). Brilliant Green 1, Boric Acid 275, French Chalk 25, Liquid Paraffin 200. The Green is incorporated, dissolved in a little spirit. For filling wound cavities.—Wilson H. Hey, B.M.J. ii./17,445.

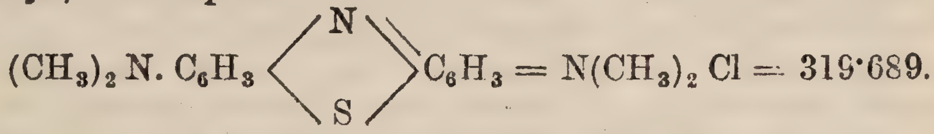
BRILLIANT GREEN may be used with the salt pack and can be used by the **Carrel Method** of repeated irrigation for which Flavine bodies are not suited.—C. H. S. Webb, B.M.J. i./17,870; ii./17,74.

GUNSHOT WOUNDS well treated by 1 in 1,000 to 1 in 500 Brilliant Green Solution in Normal Saline, also 1 in 500 in 0·5% Chloretone. The last mentioned preferred. Produces exuberant but very vascular bright red granulations. Used with advantage where anatomical conditions render primary excision impossible.—R. Massie, L. i./18,635.

CHOLERA VIBRIO is particularly susceptible to Brilliant Green. Suggested use in man. Dogs tolerate 1/5th grain *per os*.—L. Nicholls, L. ii./17,563.

Methyl Green is Chlor-Methyl-hexamethyl-*p*-rosaniline Hydrochloride. *Syn.* LIGHT GREEN.

Methylene Blue, Medicinal.—*Syn.* METHYLTHIONINÆ HYDROCHLORIDUM. U.S. X. METHYLENUM COERULEUM, P. Helv., FR. CX. ($+3H_2O$) **P. Jap. IV.**



$$(CH_3)_2N.C_6H_3 \left\langle \begin{matrix} N \\ \\ S \end{matrix} \right\rangle C_6H_3 = N(CH_3)_2Cl = 319{\cdot}689.$$

Dose.—1 to 4 grains (**0·06 to 0·25 Gm.**) in pill, cachet or capsule; or hypodermically, 1 grain. Slipule No. 4 holds 1 grain.

Dull dark green crystals, forming an intense blue solution in water. *Soluble* 1 in 50 —FR. CX 1 in 20.

Incompatible with caustic alkalis.

Distinguish from the commercial compound with Zinc. Vide Vol. II.

(**Night Blue** (*cf.* McCrorie's stains Vol. II.) and **Patent Blue A** are more suitable for colouring Perchloride Solution.—C. D.)

Uses.—Has been recommended as an analgesic, of service in rheumatism and painful nervous affections; also in malaria, ague, nephritis, and retinitis. *Colours urine blue, and fæces become blue on exposure to air.*

Chlorinated Soda Solution, will remove stains caused by it.

CYSTITIS.—A 2 grain capsule should be given and the bladder washed out with 2% solution. In dysentery a rectal injection 1 in 5,000. In chronic suppurative otitis media and conjunctivitis—1 in 500 solution warm is instilled. In intertriginous eczemas, 3 to 5% solution. It has been used in bilharziasis.

GONORRHŒA.—Hare suggests capsules of 2 grains, oil of sandal wood 3 minims, oleo-resin of copaiba 3 grains, oil of cinnamon 1 minim.

ULCERATIVE COLITIS.—Irrigation with methylene blue, 2 to 3 grains in 1 pint has been tried.—B.M.J. i./09,770.

BLACKWATER FEVER.—Œdema appeared lessened by its use.

For Methylene Blue and other Tests of the Kidneys, see Vol. II.

PURULENT DISCHARGE (due to *Staphylococcus aureus*) from the eye socket well treated by 0·1% Methylene Blue solution.—H. M. McIlroy, B.M.J. i./19,405.

MALARIA treated by Methylene Blue—experience of 5,000 three grain doses. Though inferior to Quinine in cutting short attacks it is valuable in preventing relapses. No fear of 'toxic' symptoms.—D. G. Marshall, L. i./20,1334.

Methylene Blue used as a substitute for Quinine in mild but refractory cases. It is given in 0·1 or 0·2 Gm., to a total of 1·5 Gm.—Pres., Jan. '27,26.

ACTINOMYCOSIS. Methylene Blue in 2 grain doses thrice daily, increased to 5 grains has been used. Nausea, dizziness and weakness were evidenced at first but soon disappeared. A 3% solution was injected locally but abandoned on account of pain. X rays alone or in combination with drugs should be sufficient.—Jl. A.M.A. Nov. 27/1920, p. 1470, per Pres. Feb. '21, p. 34.

Intrapleural injection of 200 Cc. of a 5% solution of Methylene Blue caused death in a case of empyema. Animal experiments showed that 0·0005 Gm. of Methylene Blue is toxic, and 0·005 Gm. lethal, for mice.—D. M. W., per Jl. A.M.A., ii./25,395.

Soudan Red III. AMINOAZOBENZENE-AZO-BETANAPHTHOL. $C_{22}H_{16}N_4O.$=352·16. A brown dye for colouring fats, and in histology.

Chrysoidine.—DIAMIDOAZOBENZENE HYDROCHLORIDE. $C_6H_5N_2C_6H_3(NH_2)_2HCl.$=248·593. An orange dye slightly soluble in water.

Phenacetinum. *Syn.* **Acetphenetidinum, Acet-para-phenalide** (*B.P.* '14), **U.S.**, FR. CX., **P. Austr., Ph. Ned. V.**
$C_2H_5O.C_6H_4.NH.COCH_3$ 1 4=179·112.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**), in cachets, tablets (Slipule No. 1 holds 5 grains), or suspended in mucilaginous fluids. **P.G.V.** max. single dose 15 grains. Max. during 24 hours 45 grains. approx.

An acetyl compound of Phenetidin, $C_6H_4(NH_2)\ OC_2H_5$=137·096 (the ethylic ether of paraminophenol). It is analogous to acetanilide (antifebrin). White, shining, laminar crystals, M. pt. 135° C., tasteless, ***soluble*** sparingly in water, 1 in 21 of alcohol (90%), and in sulphuric acid without colour.

Manufacture, Notes on.—*See Vol. II.*

Does not liquefy with sodium salicylate, but phenazone does, *e.g.*, Phenacetin 10 grains, Caffeine Citrate, 2 grains, Sodium Salicylate 5 grains, are not incompatible.

Uses.—Reduces temperature and soothes pain, very rarely causes rash or cyanosis. Successful in rheumatism, neuralgia, migraine, and hysteria. In first stage of influenza relieves headache and mitigates aching of limbs. Doses of 4 to 8 grains reduce temperature in cases of pyrexia, but effects are only of short duration.

The safest of the antipyretics.—Dixon, p. 245.

Phenacetin acts slower, but more enduringly than Phenazone. It is oxidised in the tissues and is excreted as sulphate and glycuronate compounds of acetyl-paramidophenol.—Gordon Sharpe.

This and other anilides, *e.g.*, Acetanilide are only slowly hydrolised in the organism with liberation of the parent basis—hence their activity.—O. C. M. Davis, B.M.J. ii./22,11.

Useful to control pains in tabes dorsalis.—L. i./10,355.

Toxic Effects.—Numerous reports have been made concerning large amounts (60 to 70 grains) taken in error or intentionally. Treatment has been stimulants: Whiskey, Strychnine hypodermically, strong coffee, large quantities of hot water (*not* stomach tube).

Effervescent Phenacetin. *Dose.*—1 drachm (**4.0 Gm.**) or more.
In two strengths, 5 and 10 grains in 1 drachm respectively.

Tablets 4, 5 and 10 grains. Also 4 grains with **Caffeine** 1 grain, also Ⓟ $2\frac{1}{2}$ grains with **Sulphonal** $2\frac{1}{2}$ grains. *Dose.*—1 or more.

Phenacetinum cum Caffeina Effervescens.

Dose.—1 to 2 drachms.

Contains 5% Phenacetin and 2½% Caffeine Citrate.

Phenocoll Hydrochloridum, Hydrochloride of Amido-acet-para-phenetidin, a derivative of Phenacetin.

TRADE MARK: The word Phenocoll alone is not registered. T.M. 157131 (1891) is a device embodying the word. PATENT 5269/1891 ***expired*** 1903.

$$C_6H_4\left\{\begin{array}{l}O.C_2H_5\\NH(C_2H_2O)NH_2\end{array}\right\}HCl.=230\cdot593.$$

Dose.—8 to 15 grains (**0·5 to 1 Gm.**).

Manufacture.—By the action of Ammonia on Bromo-phenacetin.

A white crystalline powder with sharp saline taste. ***Soluble*** about 1 in 16 of water.

Combined with Piperazin in effervescent form (*q.v.*) is useful in rheumatoid arthritis. Also beneficial in neuralgia arising from sudden cold and for headaches and pertussis (½ grain hourly). Successful as a prophylactic in malaria.

Phenazonum (*B.P.* '14). U.S. X., FR. CX., P.G. VI., PH. NED. V., etc. *Syns.* ANALGÉSINE, ANTIPYRINUM, DIMETHYL OXY-QUINIZINE, PHENYLDIMETHYL-ISO-PYRAZOLONE.

TRADE MARKS: ✱ "Dr. Knorr's Antipyrine" No. 42855, was Registered in 1885, and has since been periodically renewed. A label bearing the word Phenazon and device of 3 stars is also a T.M.—No. 208865.

PATENT: 3097/1884 to the same firm remained in force 14 years, but now ***expired.***

$$(CH_3)\underline{N.C(CH_3) : CH. CO. N}(C_6H_5)=188\cdot113.$$

Dose.—5 to 15 grains (**0·3 to 1 Gm.**) in cachets, tablets, or solution. Slipule No. 1 holds 5 grains; No. 0 holds 10 grains. **U.S.** *Average dose.*—5 grains.

Manufacture.—Condensation of Phenylhydrazine and Aceto-Acetic-Ethyl Ester followed by methylation.—C.D. ii./14 p. 273.

In white crystalline bitterish scales or powder. Gives a deep red colour with solution of ferric chloride, nearly discharged by diluted sulphuric acid.

Soluble 1 in 1¼ of water, about 1 in 1 of alcohol and chloroform, and 1 in 40 of ether.

Flavoring.—Glyl Menthæ Piperitæ, Glyl Rosæ, Syl Vanillæ; Aqua Menthæ Piperitæ, Syrupus Limonis, Syrupus Aurantii.

Given as an enema if contra-indicated by the mouth.

Uses.—It is an analgesic, reduces the temperature of fevers, and the pyrexia of pneumonia, pleurisy, phthisis, and erysipelas. In doses of 4 to 15 grains it relieves locomotor ataxy, chorea, migraine, facial neuralgia, rheumatism, sciatica, and sea-sickness. Hypodermically for lumbago, sciatica, angina pectoris, biliary and renal colic, and dysmenorrhœa. A skin rash has at times been observed after its use, and in the past some poisonous effects were reported. Solution applied locally is hæmostatic.

Antidotes.—Administer brandy or ether, atropine, strychnine or oxygen. Warmth to the feet and body.

Antipyrin was used by Lieut. Clark in the murder of Mr. Fulham in India—the amount given being 4 drachms. This appears to be the first time the drug has been used for murder.—P J. i./13,325,349.

Phenazone acts quickly, but its effects soon pass off. It acts partly as phenazone and partly as oxyphenazone, and is excreted as such. Interesting details *re* discovery and early uses. In 1884 Guttman used it to reduce the temperature of enteric, pneumonia and pleurisy with such success that the Germans believed they had found a panacea for reducing temperature, and by this means also for "curing" all conditions associated with fever. They boasted of conducting such fevers at normal temperature by continuous dosage of the new drug. Antipyretics became an obsession like the possession of Paris or Calais at a later date.—Gordon Sharp, P.J. ii./15,198.

Incompatible with spirit of nitrous ether, or other nitrites in the presence of free acid, an apparently inert bluish-green iso-nitroso-antipyrine being formed; also with the cinchona alkaloids, forming a precipitate which is soluble in weak acids.

Further, with phenol, tannic acid, iodine, or mercuric chloride (precipitates); amyl nitrite, ammonia alum, hydrochloric acid, ferric chloride, ferrous and ferric sulphates, cupric sulphate, or nitrous acid cause discolourations; with calomel, as a highly toxic product may result; sodium bicarbonate decomposes it with production of an odour resembling acetic ether; orthoform produces a pasty mass. In general it is best to administer antipyrin alone.

Calomel and Antipyrin are incompatible. Reaction does not occur in presence of water or acid media such as gastric juice but in the presence of alkali changes occur which cause marked toxicity. Chemical compounds discussed.—J.C.S.A. i./20,94.

Liquefactions occur on rubbing it with butyl-chloral hydrate or sodium salicylate, but solutions with the latter keep without perceptible change if dilute. Liquefaction also occurs on mixing with β-naphthol.

SCIATICA.—The following relieves the painful symptoms:—Phenazone 6 grains, Phenacetin 3 grains, Exalgin 1⅓ grains, Potassium Sulphate 1½ grains, Dover's Powder (*sine Ipecacuanha*) 3 grains. To be given in a cachet three or four times in the 24 hours. Good effects are also obtained from the following:—Phenazone 5 grains, Phenacetin 5 grains, Opium Powder ⅙ grain, in a cachet; 3 to 6 of which can be taken each day.

Antipyrin (4 Gm. in 10 Cc. of water with a little Novocain) by perineural injection also alleviates pain.—Pr. May '25,382.

In middle-ear diseases, otitis media and inflammation of the tympanum, and tympanic membrane a 5% solution of Phenyl-dimethyl-pyrazolone (✱**Otalgan**, T.M. 416863) in Glycerin is used by instillation.

Effervescent Antipyrin contains 5 or 10 grains in a drachm. *Dose.*—One teaspoonful or more.

Injectio Antipyrin Hypodermica.—1 grain contained in 2 minims. *Dose.*—8 to 30 minims (**0·5 to 2 Cc.**). **Sterules, Hypodermic** contain 4 grains (**0·25 Gm.**). The pain it causes may be lessened by the addition of cocaine, as in—

𝔇 𝔓1 **Injectio Antipyrin et Cocainæ Hypodermica**, containing 1 grain of Cocaine Hydrochloride in 150 minims of above. *Dose.*—8 to 30 minims (*vide* also Liquor Cocainæ et Antipyrin).

𝔇 𝔓1 **Tubache's Method** of treating sciatica.

Dose.—1 Cc. injected along the course of the nerve of a Solution of Phenazone 1 drachm, Cocaine Hydrochloride 1 grain, Sterile Water 1 drachm. Some 8 to 10 injections at intervals of 3 or 4 days. Pain after each lasts 6 hours. Sometimes Morphine necessary.

𝔅 𝔓1 **Sterules, Hypodermic** contain 4 grains of Antipyrin with Cocaine Hydrochloride $\frac{1}{20}$ grain. The latter may be increased.

Tablets of Antipyrin contain $2\frac{1}{2}$ and 5 grains each. *Dose.*—1 to 4 or more. Also 3 grains and **Caffeine** 1 grain.

Mistura Phenazoni Expectorans, St. Th. H.

Dose.—1 to 2 drachms (**4 to 8 Cc.**).

Phenazone 1 grain, Potassium Iodide $\frac{1}{2}$ grain, Ammonium Carbonate $\frac{1}{2}$ grain, Ipecacuanha Wine 3 minims, Syrup $\frac{1}{2}$ drachm, Dill Water to 1 drachm.

Local hæmorrhage of hæmophilia has been treated by application of a strong solution of Antipyrin in Ferric Chloride.

Ⓟ**Pommade Reclus.** Phenazone 5, Salol 3, Boric Acid 3, Iodoform 1, Phenol 1, Mercuric Chloride 0·1, Vaseline to 200. The formula is often modified, *e.g.*, that of Fr. Cx. Nouv. Supp. '26—it may be diluted or made much stronger. For burns 1 or 2% Orthoform may be added.

Antipyrinum Salicylicum, **P. Austr., P. Belg., Fr. Cx., P. Helv., P. Jap., P.G. VI., Ph. Ned. V.** *Syn.*—SALIPYRIN, PYRAZOLONUM PHENYL-DIMETHYLICUM-SALICYLICUM.

$C_{11}H_{12}N_2O.C_6H_4(OH)(COOH)=326{\cdot}16$. *Dose.*—15 to 30 grains (**1 to 2 Gm.**). Max. single dose 2 Gm., *pro die* 6 Gm.

Manufacture.—Warm on a water bath Antipyrin 188 with Salicylic Acid 138. They liquefy and on resolidifying may be recrystallised from Alcohol.

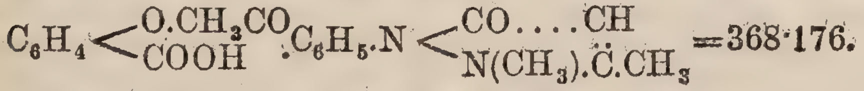
The process in the Patent Specification 10432/1890 which was in force for 12 years states that Phenylhydrazin, Aceto-acetic Ether, Methyl Salicylic Ether, Hydriodic Acid and Methyl Alcohol have to be heated together under pressure at 160—180° C. (!)

A white crystalline powder, with sweetish taste, sparingly *soluble* in water; incompatible with acids, alkalis, and nitrites.

Useful in acute rheumatic fever, and in chronic rheumatism, and sciatica; also for influenza and any acute catarrh and for menorrhagia; as antipyretic in dose double that of Antipyrine.

Tablets contain 5 grains (0·3 Gm.).

✱**Acetopyrin** (T.M. 233820).—*Syn.* ANTIPYRIN ACETO-SALICYLAS.



$$C_6H_4 < \begin{matrix} O.CH_3CO \\ COOH \end{matrix} . C_6H_5.N < \begin{matrix} CO \ldots . CH \\ N(CH_3).\dot{C}.CH_3 \end{matrix} = 368{\cdot}176.$$

Dose.—8 to 15 grains (**0·5 to 1 Gm.**).

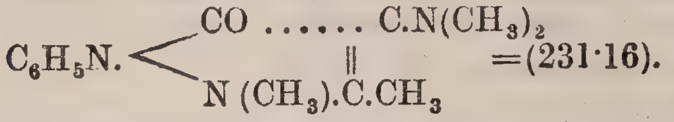
A white crystalline powder, ***soluble*** 1 in 160 water, but about 1 in $3\frac{1}{2}$ of Alcohol 90%. Analgesic, antipyretic, and anti-arthritic, used in sciatica, hemicrania, influenza, etc.

Ferropyrin. $Fe_2Cl_63(C_{11}H_{12}N_2O)=888{\cdot}758$.

Dose.—3 to 8 grains (**0·2 to 0·5 Gm.**).

A *soluble* orange-coloured powder. Given for chlorosis and anæmia. It is hæmostatic and locally astringent, applied pure or 20% aqueous solution; and in gonorrhœa, injections 1%. *Incompatible* with Salicylic Acid.

Amidopyrin. U.S. X. ✱ **Pyramidon.** Dimethyl-Amido-Antipyrinum. *Syn.* DIMETHYL-AMINO-ANTIPYRINE. Ph. Ital., FR. CX., P. JAP., P.G. VI., PH. NED. V.

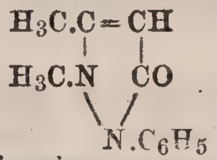


$$C_6H_5N.\left\langle\begin{array}{l}CO\ \ldots\ldots\ C.N(CH_3)_2\\ \qquad\qquad\ \ \|\\ N\,(CH_3).C.CH_3\end{array}\right. =(231{\cdot}16).$$

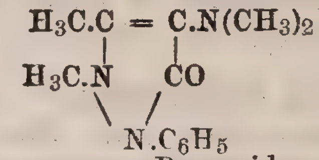
Dose.—5 to 8 grains (**0·3 to 0·5 Gm.**). Slipule No. 0 holds 5 grains. FR. CX. has max. single 15 grains; max. during 24 hours 45 grains approx.

TRADE MARK: 215952, also 360918. PATENTS: 7709/1896 and 9268/1897 (now ***expired***). U.S. Patent 579,412 (1897).

Manufacture. — The following indicates the position of the Dimethyl-Amido group:



Antipyrin.



Pyramidon.

Nitrosoantipyrin is reduced to Amidoantipyrin which is then methylated. (*See* also Edn. XVII, p. 316 and Edn. XVIII, p. 336.)

A white powder with M.pt. 108° C. ***Soluble*** about 1 in 9 of water and 1 in 2 of alcohol 90%. Incompatible with Amyl Nitrite, Apomorphine and Gum Acacia.

Uses.—Antipyretic; similar to Phenazone, but effective in smaller doses; of special effect in sciatica. A **Camphorate** (*dose*—8 to 12 grains), **Bicamphorate** and **Neutral Camphorate,** PATENT 22,391/1900 (*void*), (*dose* — 12 to 15 grains), and **Salicylate** (PATENT 11,040 of 1900, *lapsed*) (*dose*—8 to 12 grains) are also prepared.

The Camphorates are antipyretic, and have been advocated to suppress the sweats in phthisis, but why combine the antipyretic with Camphoric Acid—an active antisudorific? The Salicylate is given in rheumatic affections. ✱**Trigemin** (T.M. 256068/1903. PATENT 15,782/1903, lapsed 1909), (*Dose*—12 grains) is a Butyl-chloral Hydrate compound made by combining the constituents in molecular proportions (193·4 of Butyl Chloral Hydrate and 231 of Amidopyrin) on the water bath. We find this method works quite satisfactorily. After cooling recrystallise from Benzene. Is not a hypnotic; for neuralgia, and sciatica.

In fibrositis 6 grain doses enhance utility of Aspirin (10 grains) in relieving pain.—A. P. Luff.

P1 **Amidopyrin diethyl-barbiturate, Dimethylaminophenyldimethylpyrazolon Di-ethylbarbiturate.** *Syn.* ✱ P1 VERAMON (T.M. 418411). $C_{34}H_{46}N_8O_5$=646·432.

Dose.—Adult 1 to 1½ tablets; children ½ to 1 tablet, followed by half glass of water.

A combination of Amidopyrin and Veronal for use as analgesic in headache, migraine, neuralgia and other forms of pain.

P1 ✱ **Cibalgin** (T.M. 455201).
A compound of Amidopyrin with Dial.
Tablets 4 grains (0·25 Gm.): *Dose* 1 to 4. Liquid for oral use, 1 Cc.=0·25 Gm. (4 grains) Cibalgin: *Dose* 1 to 4 Cc. Ampoules each containing 2·3 Cc. Cibalgin (1 Cc.=0·25 Gm.): *Dose* ½ or 1 ampoule daily. The tablets and liquid should be taken with a little warm water or tea, but not in coffee. In neuralgia, migraine, and other types of pain, *e.g.*, dysmenorrhœa, articular and muscular pain.
Annotation on.—B.M.J. ii./25,910.

✱ **Dismenol** (T.M. 432802) is a mixture of Amidopyrin and Parasulphamidobenzoic Acid, $C_6H_4.SO_2.NH_2.COOH$, used in dysmenorrhœa.
Dose.—1 tablet two or three times daily.

COCÆ FOLIA.

P1 "*Coca, any preparation or admixture of, containing* 0·1 *or more per cent. of Coca alkaloids.*

D *Cocaine and Ecgonine and their respective salts, preparations and substances containing not less than one-tenth per cent.* (*one part in* 1000) *of cocaine or ecgonine.*

See also Dangerous Drugs Acts.

History of Coca. The plant originally named "Khoka," meaning "the tree of trees," first became known in Europe through the writings of Garcilaso Inca de la Vega, a student of Peruvian history, who died in 1616. Joseph de Jussieu in 1750 was the first to send specimens of the plant to Europe.—P.J. i./09,28; i./09,485.

D P1 **Cocæ Folia** (B.P. '98). *Syn.* Cuca.

Dose.—½ to 2 drachms (**2 to 8 Gm.**).

The dried leaves of Erythroxylum Coca and its varieties (*Linaceæ*) Fr. Cx.

Two varieties occur in commerce, the leaves of *E. Coca* var. *Bolivianum,* known as Bolivian or Huanuco leaves, and those of *E. Truxillense* (Rusby), the Peruvian or Truxillo variety, which is sufficiently distinct to be now considered as a separate species, although formerly regarded as a form only of *E. Coca.*

The Bolivian leaves are browner, larger, broader and thicker; the veins are prominent; and there are clearly defined lines on each side of the midrib, which shows a distinct ridge in its centre.

Those of *E. Truxillense* are pale green; less oval and more elliptical in outline; and are much more fragile, being frequently broken.

The Bolivian leaves, imported from that country, are preferred for medicinal use, since a larger proportion of the alkaloids is Cocaine. Java supplies most of the Truxillo variety. Ceylon was at one time a regular producer, but cultivation was abandoned at the request of the British Government.

To avoid the loss of alkaloid during transport of the leaves, it is customary in Cocaine manufacture to isolate the crude alkaloid near the plantations, purification being carried out in Europe.—From C. & D. Commercial Compendium, i./25,149.

Morphological and histological characters of a large number of Cocas, with elaborate data as to thickness, shape, and size of leaves.—C. W. Ballard, Jl. Am. Ph. A., May, June, July '26, per C. D., Oct. 30/26,657.

The leaves contain the crystalline alkaloid Cocaine, *q.v.* A content of 0·5% of this base has been suggested as a standard. For B purposes 0·1% of Cocaine or Ecgonine brings the leaves within the meaning of the Act. They are said to be most active when freshly dried, and are much used by the natives in Bolivia and Peru, miners, travellers, and others. *For details of assay by the author and others vide Vol. II.*

COCA LEAF CHEWING IN BOLIVIA. To the Indian there are two things for the attainment of which all else is only the means—coca and alcohol. The Indian of the Puna (highlands) chews coca incessantly, in addition to a small bit of lejia—a grey substance like a bit of tailor's chalk, composed of boiled potatoes ground into a paste with wood ash, dried and made into little flat cakes. This enhances the flavour and effect (it liberates the alkaloids). Some peons use as much as two pounds of dried leaf per week.—From 'Six Years in Bolivia' by A. V. L. Guise (T. Fisher Unwin), quoted, P.J. i./23,55.

Ⓟ **Coca-Chewing Gum** is prepared containing in each piece (weighing 45 grains) 2 grains of extract(=about $\frac{1}{25}$ grain of Coca Alkaloids).

Ⓟ **Elixir Cocæ.**—6 parts are equivalent to 1 of the leaves.

Dose.—1 to 4 drachms (**4 to 15 Cc.**) in water is a palatable preparation. Standardised to 0·075% Coca Alkaloids.

B P1 **Extractum Cocæ.**

Dose.—2 to 15 grains (**0·12 to 1 Gm.**), in pills or pastils. A 'solid' or powdered extract. Made with alcohol 60% standardised to 2% Coca Alkaloids (1=about 4 of leaves).

B P1 **Extractum Cocæ Liquidum** (B.P. '98).

Dose.—½ to 1 drachm (**2 to 4 Cc.**). 1=1 of leaves exhausted with 60% alcohol. It therefore contains approx. 0·5% Coca alkaloids. (45 or even 30% alcohol would make it more miscible.)

A single emergency dose of Extractum Cocæ Liquidum (1 in 1), said to act 'like a charm' in cases of *hæmorrhage due to piles*, when patient has to stand for any length of time.—C. E. Shelley, Pr., Sept., '23/211.

If freed from wax, it is miscible with water and more palatable.

Flavoring.—Syl Vanillæ, Glyl Coriandri; Elixir Saccharin.

B P1 **Fluidextractum Cocæ, U.S.** *Dose.*—30 minims. Standard 0·5 Gm. ether-soluble alkaloids in 100 Cc.

Ⓟ **Infusum Cocæ.**—1 in 50 of boiling water.

Is a refreshing beverage with a slice of lemon.

B P1 **Pastillus Cocæ Extracti.**—2½ grains (**0·15 Gm.**) of the extract in each. Each contains 1/20 grain Coca **Alkaloids** (0·25%). *Dose.*—One every two or three hours.

For loss of voice due to weakness or relaxation of the vocal cords.

B P1 **Vinum Cocæ.**

Dose.—¼ to ½ ounce (**8 to 15 Cc.**) diluted with wine or water. Checks vomiting of irritable stomach.

To be sold without a licence it must contain half a grain of alkaloid in the ounce (0·114%).

Uses of Coca.—Coca has been praised as a nervine and muscular tonic, preventing waste of tissue, appeasing hunger and thirst, relieving fatigue, aiding free respiration, and as being useful in various diseases of the digestive and respiratory organs ; it is recommended for indigestion, gastralgia, gastrodynia, nausea, sickness, distaste for food, is given to relieve pain, nausea, vomiting or discomfort caused by excess in either eating or drinking, or by pregnancy, and as a cure for morphine and alcohol craving. In using it for the latter in America it is said in some case to have produced 'Coca Craving.' The leaves are sometimes smoked to relieve asthma ; and used generally for the stimulant and narcotic effect of tobacco and alcohol.

B **P1** **Cocaina** (*B.P.* '14). *Syn* METHYL-BENZOYL-ECGONINE.

$C_9H_{13}(CH_3)\,(C_6H_5CO)NO_3=303{\cdot}176.$

Dose.—$\frac{1}{20}$ to $\frac{1}{2}$ grain (**0·003 to 0·03 Gm.**), in a pill or tablet.

This important alkaloid, obtained from Coca, was first isolated by Niemann in 1860. It crystallises in shining monoclinic prisms.

CONSTITUTION OF COCAINE *is dealt with in Vol. II.*

Cocaine in Liquid Extracts gradually undergoes hydrolysis and the accompanying alkaloids do so more rapidly than the Cocaine. Jowett argues against the galenical preparations of Coca. Amongst the accompanying alkaloids γ-isatropyl-cocaine (*syn.* α-truxilline or Cocamine) is a powerful heart poison which may be present in varying amount. This is stringently excluded from the alkaloid Cocaine and its salts.—P.J. i./13,364

For Notes on Extraction of (Crude) Cocaine see Vol. II.

P1 SYNTHETIC COCAINE. Possibilities of industrial production as outcome of Willstätter's work.—B. & C.P., Feb. 1924.

Soluble 1 in 10 of 90% alcohol, about 1 in 100 to 150 of liquid or soft paraffin ; 10 to 20% of olive oil will assist solubility, freely so in chloroform (**2 in 1**), ether (about 1 in 4), oil of cloves, and many other volatile oils, and 1 in 10 of castor, and other fixed oils, 1 in 2 of anhydrous lanolin (warmed) ; 1 in 80 of petroleum spirit. Soluble in water to the extent of 1 in 1300. In 1% Sodium Bicarbonate 1 in 1000. Insoluble in glycerin.

Cocaine Addiction.

Cocaine fascinates by the rapidity with which it relieves exhaustion and dispels gloom by producing a delightful sense of mental and physical vigour. The habit, according to Prof. W. E. Dixon, B.M.J. i./23,545, is not common. News reports concern rather cases of users of the drug for specific purposes than addiction. The discomforts caused by Cocaine are readily controlled by Morphine. When the patient learns this, the addiction becomes confirmed. **Atropine**, or better, **Hyoscine** is the ***best for treatment of Addiction*** of all kinds. De Quincey found benefit from **Valerian.**

COCAINE SNIFFED UP THE NOSE is readily absorbed. It first powerfully stimulates the brain—the flagging nerve cells are whipped into activity and lassitude and fatigue pass, but a marked depression of the central nervous system succeeds. Abstinence symptoms are less severe than in the case of Morphine. It can be cut off at once.—W. E. Dixon, B.M.J. ii./21,821.

In Cocaine addiction, ¼ grain produces very little effect on an ordinary person, 1½ grains is usually well tolerated, and the total dose varies between 8 and 23 grains. The action of the drug varies greatly with different individuals and when death results it is due to sudden paralysis of the central nervous system. Withdrawal symptoms in Cocaine are less severe than with

Morphine and Heroin. The 5% B.P. Injection is too strong; the FR. CX. 1% solution is quite strong enough.—W. E. Dixon, Society for the Study of Inebriety, B.M.J. ii./24,765.

The public ought not to be deprived of commodities or services because of possible abuse of them by invincibly ignorant, incurably stupid, culpably careless or evilly disposed persons.—P.J. ii./24,332.

"Medically advisable" treatment for addicts.—P.J. ii./24,407.

FORTY YEARS IN THE PROFESSION AND NEVER SEEN A DRUG ADDICT.—Legislation gone mad. Faddists and cranks passing vexatious laws because a few degenerates have tried to get a new sensation out of a useless life by taking drugs.—E. E. Duffy, B.M.J., ii./26,408.

While the U.S. official figures show the use of Cocaine is diminishing, and in England it does not appear to be increasing, in Germany and Switzerland the habit appears to be spreading very fast.—B.M.J., i./26,487.

Synthetic drugs not so habit-forming as Cocaine and Morphine.—GENEVA CONFERENCE, LEAGUE OF NATIONS, B.M.J. i./22, 724, 728.

(*For further on the Geneva Conferences, see p.* 627.)

Possibility of Cocaine substitutes becoming drugs of addiction.—Committee to enquire.—B.M.J. i./25,741.

La Cocaine, by Courtois-Suffit (Masson & Cie, Paris) may be consulted.

See also paragraphs under ***Morphine Habit, Abuse of Opium.*** *Consult also* ***Dangerous Drugs Acts*** (Departmental Com. on Morphine, etc.), Addiction, p 628, and Vol. II. (*Septum perforation,* ***Harrison Federal Law,*** etc.).

Cocaine Poisoning.—Methods of examination of stomach washings, urine, etc. Limits of fatal doses. 3½ grains injected into the breast of a woman caused death in 20 minutes.—Useful summary.—B.M.J. i./13,16.

Antidotes.—Stomach-tube. Toxic effects are best counteracted by amyl nitrite, nitro-glycerin, digitalis, strychnine, or ammonia, with strong coffee by mouth or enema, and ether hypodermically (5 minims). Anæsthesia by chloroform and ether may be required to prevent respiratory spasms.

Hyoscine hypodermically, or 10% solution of Calcium Chloride intravenously have been found safe antidotes for incipient Cocaine poisoning.—L.ii./23,1300

Urethral Injection of 3 grains in retention of urine has caused poisoning.

D P1 **Bougies of Cocaine ½ grain (0·03 Gm.)** or more, with cacao butter. Useful in urethral affections.

D P1 **Cocaine-Lanolin**—*Martindale,* containing 10% Cocaine Hydrochloride, is a special preparation useful for dental cavities containing hyper-sensitive dentine prior to filling. A small amount to be carefully sealed in the cavity and left for two or three days.

It is found to act "like a charm" on sensitive erosion cavities.

D P1 **Cocaine - Menthol - Phenol.**—Equal parts liquefy and form a paste for inserting into tooth cavities; stops the pain promptly.

Mélange Anesthésique de Bonain, FR. CX. Nouv. Supp. '26, is this, using Cocaine Hydrochloride.

D P1 **'Cocaine-Menthol-Eugenol'**—Cocaine, Menthol, Eugenol and Alcohol 90% equal parts. Applied on a pledget of cotton wool, followed by jets of cold air, *e.g.*, from a chip syringe, relieves toothache rapidly

D P1 Camphor 5, Chloral 5, Cocaine Hydrochloride 1, warmed, form an oily liquid which cures toothache.

D P1 **Cocaine in Clove Oil,** 5%. Releives toothache and earache.

D P1 **Collodium Cocainæ,** 2% in flexible collodion. Allays itching, and is a cure for inflamed chilblains.

D P1 **Emplastrum Cocainæ.**—1 dissolved in 50 of melted lead plaster. Useful for intercostal neuralgia, sciatica, tender corns, bruises, &c.

D P1 **Nebula Cocainæ Oleosa.**

Cocaine Base 1, Oleic Acid 4, Liquid Paraffin to 20. May be made stronger, but this 5% strength should prove sufficient in most instances. (12 grains of base dissolve in 1 ounce of almond oil.)

In cauterising laryngeal growths a solution of the base in olive oil has been used to anæsthetise the tracheal mucous membrane and allay the cough.

D P1 **Oleum cum Cocaina.**

A 2% solution in almond oil is mostly used for earache. For the eye a 2% solution in **Castor Oil** is used, may be combined with Homatropine; for catheters, a solution in equal parts castor and almond oils is useful.

P1 **Cocaine Eye Drops, Factory Act, Solution No. 1.**

Specifically exempted from D *but caution it is* P1. *See also Dangerous Drugs Acts.*

For a foreign body in the eye.

Dissolve powdered Cocaine (base) 0·5 Gm. in Castor Oil 95 Gm. on a water bath. While still warm add 1 Cc. of a solution containing 0·33 Gm. Mercuric Chloride in 10 Cc. of Absolute Alcohol. Mix by rotating. Apply with a camel hair brush.—Issued by the Factory Dept. of the Home Office, 1917.

D P1 **Unguentum Cocainæ** (*B.P.*'14).—Cocaine 4%. Useful where absorption is required, as in facial neuralgia, shingles, eczema, erysipelas, urticaria, and pruritus (R.O.H. has Cocaine 1, to Soft Paraffin 50; heat to dissolve and stir till cold).

Assay of Cocaine in *B.P.* '14 ointment.—H. J. Foster, P.J. i./21,479.

D P1 **Petrolatum Cocainæ.** Is made with Cocaine (base), 1, 2, 4, and 10%. The 1 or 2% are suitable for eye work, and the 4 and stronger percentages are useful for catheterisation, burns, and for intense sensitiveness of parts, pruritus, &c.

D P1 **Cocainæ Citras.**

$[C_{17}H_{21}NO_4]_2C_3H_4OH.(COOH)_3 = 798{\cdot}416.$

Dose.—$\frac{1}{20}$ to $\frac{1}{2}$ grain (**0·003 to 0·03 Gm.**)

In deliquescent white crystals; used by dentists.

D P1 **Cocainæ Formas.**

$C_{17}H_{21}NO_4.H.COOH = 349{\cdot}192.$

Dose.—$\frac{1}{20}$ to $\frac{1}{2}$ grain (**0·003 to 0·03 Gm.**).

Prepared by combining Cocaine 303 with 46 of pure Formic Acid.

Crystalline needles, ***soluble*** about 1 in 40 of water, and about 1 in 2 of alcohol 90% Slightly soluble in chloroform and ether, Insoluble in olive oil or in soft paraffin.

D P1 **Cocainæ Hydrochloridum.** In most national Pharmacopœias. $C_{17}H_{21}NO_4HCl = 339{\cdot}641$. To be anhydrous.—F.I.

Usual Dose.—$\frac{1}{20}$ to $\frac{1}{2}$ grain (**0·003 to 0·03 Gm.**), but more may be given, in solution, pill or pastil. (*B.P.* '14) $\frac{1}{10}$ to $\frac{1}{4}$ grain. *Hypodermically* $\frac{1}{4}$ to $\frac{1}{2}$ grain (**0·015 to 0·03 Gm.**).

Fr. Cx. & P.G. VI *maximum single dose*, $\frac{3}{4}$ grain; maximum during 24 hours, $2\frac{1}{4}$ grains approx.

Shining, lamellar crystals, with bitterish **taste. One part of Cocaine base=1·12 of the Hydrochloride.**

Soluble 2 in 1 of water, also in alcohol and in glycerin, insoluble in ether, fats, and oils. It will crystallise with 9·5% of water of crystallisation, but the anhydrous salt is preferred M. pt. 183° C.

Glycerin of Starch is a useful solvent. A solution in this can be applied locally without lint or wool. Keeps well and is economical. —J. T. Hall, B.M.J. i./17,765. L. i./17,824.

Incompatible with ammonium carbonate (soluble in excess), carbolic acid, mercuric and mercurous chlorides. It is also precipitated by borax.

When borax and Cocaine hydrochloride are prescribed together, a weight of Boric Acid equal to that of the borax should be ordered at the same time to prevent precipitation.

In dispensing White Precipitate with cocaine hydrochloride in the form of an ointment, dissolve the cocaine salt in a drop or two of water. Rub the white precipitate down with **a** little almond oil, mix, and add the remainder **of the ointment base—*e.g.*, soft paraffin.**

With Phenol, Cocaine Hydrochloride is compatible in presence of Glycerin or Alcohol but not in aqueous solutions.—P.J. i./25,233, C. & D., i./25,313.

Uses.—*See page* 340.

Cocaine in Dental Extractions.

D P1 **Dental Anæsthetic**—*Martindale*, is used as a local anæsthetic for extraction. It contains 0·85% Cocaine base and Iodine in the requisite chemical combination, together with hæmostatics and is harmless in action.

Dose.—The amount used varies with the number of teeth to be removed. In view of the fact that $\frac{1}{2}$ *grain of Cocaine should not be exceeded,* 50 *minims may be considered a maximum. The usual dose may be put at* 10 *to* 25 *minims.*

The injection is made alongside the teeth to be extracted. Some transitory swelling of the gums may be expected after all local anæsthetics.

(The British Pharmacopœia 1914 gives $\frac{1}{4}$ to $\frac{1}{2}$ grain approx. as an ordinary hypodermic dose in the Hypodermic Injection of Cocaine).

The Dental Anæsthetic contains nothing of the nature of Adrenalin, but a small dose of the 1 in 1,000 solution *may be added at the time of use if excessive hæmorrhage be feared*, or it may be injected afterwards in severe operations to arrest primary or secondary hæmorrhage. See also Hæmorrhage, Dental. Therap. Index.

A user of this preparation (P.G.) wrote us (May, '27):

"I have much pleasure in endorsing the remarks in my letter sent to you in 1916, that I had at that time extracted hundreds of thousands of teeth with the anæsthetic without even one unsatisfactory operation. During the 10 or 11 years that have elapsed since sending that letter, I may state that *if* 50,000 *extractions were added this would be a very moderate and certainly underestimated number up to date*, and on every occasion the anæsthetic has done everything I could have wished for.

"Before commencing an operation I always examine most carefully the tooth or teeth to be extracted, and the gums, and at the same time question the patient for information.

"After touching the gums with a little Dentalone or Iodine, I rest the bevelled edge at the point of the needle firmly against the gum and commence pressure of Anæsthetic. In this way, neither the operator nor the patient realises when the point of the needle has penetrated the gum, but the bleaching will show that it has taken effect, and at this stage the needle can be injected as far as desired without causing any pain to the patient. The injection should be slow and steady. Although the Anæsthetic will retain its effect for some time, there is no need to wait as is necessary with some local anæsthetics. After passing the beaks of the forceps through a flame, I proceed to complete the extraction."

Some operators make a practice of spraying the cavity after removal of the tooth, with a little 20 volume **Hydrogen Peroxide.**

The following injections **have been** recommended:—

Cocaine Hydrochloride 3 grains, Solution of Adrenine (1 in 1,000) 1 drachm, Solution of Hamamelis 7 drachms; also Eucaine 6 grains, Phenol 5 grains, Solution of Hamamelis 1 ounce.—P.J. ii./09,96. 20 minims of the former contain ⅛ grain Cocaine Hydrochloride.

(As much as 20 minims of a 10% solution,—10 minims either side of the tooth at 5 minutes interval = 2 grains of Cocaine Hydrochloride has been given, but this must be considered excessive.)

Notes on Tooth Extraction.

A 1% solution should be used, 15 to 20 minims of which gives the best results. Congestion always follows the use of Cocaine, and in most preparations Adrenalin (which is also vaso-constrictor) is added to prolong the insensibility and localise the anæsthetic. The injection should be made slowly and as few pricks with the needle as possible. Never push the needle too deep, for injury of the periosteum of the bone with the needle point may be one source of trouble. Rapid injection must be avoided, and never inject into any but healthy tissue. If the gum is septic, cleanse round the tooth to be extracted with some antiseptic on cotton-wool. Use a thoroughly sterilised syringe in good working order. In injecting there should be resistance to the pressure on the piston. Reinsert the needle if resistance is not met with. If the fluid goes into the gum too easily, it may be due to passage into loose cellular tissue, and this sometimes causes after swelling. There should be little danger of cellulitis, sloughing, or necrosis if the above instructions are followed out.—C.D., ii./09,734.

𝔇 𝔓1 **Injectio Cocainæ Hypodermica, St. Bart.'s H.**

Cocaine Hydrochloride 4½ grains, Potassium Iodide 2½ grains, Thymol ½ grain, Oil of Gaultheria ½ minim, Adrenalin Hydrochloride ½ grain. Distilled Water to 1 ounce. For dental purposes.

The addition of Adrenalin to a ¼% Cocaine solution found to increase its toxicity in proportion to the amount added.—Brit. Dent. Jl., Nov. 15, '23, 1289, P.J. i./24,81.

𝔇 𝔓1 **Calorific Fluid** for dental use.

Cocaine Hydrochloride 1, Camphor 10, Clove Oil 4, Ether 25, Chloroform 30, Absolute Alcohol 30.

𝔇 𝔓1 **Aurinaria Cocainæ Hydrochloridi.** — EAR CONES, contain 1/10 grain in each with Cacao Butter basis.

𝔇 𝔓1 **Guttæ Cocainæ Hydrochloridi, R.O.H.,** 2 or 5%. R. N. H. 2%.

𝔇 𝔓1 **Guttæ Cocainæ cum Adrenina.**

Cocaine Hydrochloride 5% in Adrenin Solution (1 in 1,000).

D P1 **Injectio Cocainæ Hypodermica** (*B.P.* '14).

Cocaine Hydrochloride 1 in 20 in dilute Salicylic Acid solution (0·15%).

Dose.—5 to 10 minims (**0·3 to 0·6 Cc.**).

Fr. Cx. 1% directed to be heated in the bottle surrounded by boiling water for $\frac{1}{4}$ hour, or in a steriliser at 110° C. for 10 minutes.

A solution up to the strength of 50% may be prepared in salicylic acid solution 0·15% strength, which is nearly saturated.

The B.P '98 injection was *hypertonic*. Should be *hypotonic* as it would then mix more readily with the lymph, and be carried off more quickly by the lymph circulation. A solution 0·594 Gm. in 10 Cc. is isotonic.—P.J. i./12,357.

The question is frequently asked—***Can Cocaine Hydrochloride Solutions be sterilised by boiling?*** In general the reply is that boiling sufficient to sterilise is not injurious.

We deal further with the matter in Vol. II.

Intravenous use of Cocaine Hydrochloride.—Enormous dose necessary for anæsthesia: ***not suitable for man.*** 5 grains in a 2% solution was injected into the vein of the hand—dizziness and palpitation set in. Anæsthesia even then was not perfect.—P.J. i./11,206.

D P1 **Isotonic Cocaine Eye Lotion.**

Cocaine Hydrochloride 1, Sodium Chloride 1·25. Distilled Water to 100. This is isotonic with the tears with which 1·4% Sodium Chloride solution is isotonic.—Pres.

D P1 **Hypodermic Tablets** are prepared with $\frac{1}{10}$, $\frac{1}{8}$, $\frac{1}{6}$, $\frac{1}{4}$, and $\frac{1}{2}$ grain of Cocaine Hydrochloride in each.

D P1 **Lamellæ Cocainæ, Discs of Cocaine** (*B.P.* '14) ; **R.O.H.**

Discs of gelatin, each containing $\frac{1}{50}$ grain of Cocaine Hydrochloride, are for ophthalmic use. These should be prepared in an atmosphere carefully rendered aseptic. Also prepared D P1 containing $\frac{1}{100}$ and $\frac{1}{200}$ grain in each, and in combination with D P1 Atropine Sulphate, (*q.v.*), D P1 Homatropine (*q.v.*) and D P1 Physostigmine (*q.v.*).

D P1 **Liquor Cocainæ et Antipyrin.**—Cocaine Hydrochloride 5, Antipyrin 5, Phenol 1, Water to 100. Used for painting the interior of the larynx during the operation of thyrotomy, and applied to the nostrils on cotton wool for small operations, *e.g.*, with the cautery.—C. Nourse. Also found useful for general anæsthetic purposes.

D P1 **Pastillus Cocainæ Hydrochloridi.** $\frac{1}{10}$ grain (**0·006 Gm.**) in each (or more if ordered). To allay throat irritation and hoarseness. Also made D P1 $\frac{1}{15}$ grain with **Morphine** $\frac{1}{30}$ grain.

Ⓟ **Pastils of Cocaine Hydrochloride** $\frac{1}{50}$ grain, **with Antipyrin** 3 grains, are prepared. They are useful in the treatment of asthmatic affections.

D P1 **Pilula Cocainæ Hydrochloridi.** $\frac{1}{5}$ grain (**0·012 Gm.**) in each (or more, if ordered), with milk sugar.

D P1 **Nebula Cocainæ Hydrochloridi.**—May be prepared 1, 5 or 10%, or more if ordered, with sterile 'Normal Saline' for general use.

Sprays for Cocaine Solutions should have fine aperture for the jet.

B P1 **Injectio Cocainæ et Nitroglycerini.**

Dose.—Up to 15 minims (**1 Cc.**)=($\frac{1}{2}$ grain Cocaine Hydrochloride). Cocaine Hydrochloride 5 grains, Nitroglycerin Solution (1%) 10 minims, Distilled Water to 150 minims. The Nitroglycerin is said to counteract any bad effect of Cocaine.

B P1 **'Sterules,' Ophthalmic** are prepared containing Cocaine Hydrochloride Solution 10 grains to the ounce (2·3%).

For general purposes B P1 **Large 'Sterules'** (Tube form) are prepared containing 10 minims of Cocaine Hydrochloride Solution 5% and 10% strength, *vide* also Index for **Sterules, Hypodermic.**

B P1 **Hypodermic 'Sterules' of Cocaine Hydrochloride** $\frac{1}{3}$ grain, with **Adrenalin** $\frac{1}{1000}$ grain are prepared for painless dental extraction.—(*cf.* Adrenalin).

B P1 **Suppositories** and **Pessaries** $\frac{1}{2}$ grain (**0·03 Gm.**), or more. **C.H.W.** has Suppositorium Cocainæ Vaginale, 2 grains Cocaine Hydrochloride in 2 drachms Theobroma basis. S.H. 1926 has Pessus 1 grain in 2 drachms.

A 10% solution of Cocaine Hydrochloride on wool to rigid os uteri in first stage of labour produces rapid dilatation.—B.M.J. ii./98,1374.

B P1 **Injectio Cocainæ et Sodii Bicarbonatis.** Cocaine Hydrochloride $\frac{1}{2}$, Sodium Bicarbonate $\frac{1}{2}$, Chloretone $\frac{1}{4}$, Distilled Water to 100.

Dose.—2 to 4 drachms (**8 to 15 Cc.**) for *urethral injection.*

This solution is remarkably efficacious for use prior to passing a catheter. According to our experiments the fact of the Cocaine being in part in the *basic* condition renders the solution more efficacious and anæsthetic in effect than a solution of even 4% or 5% Cocaine Hydrochloride, employed in a similar manner. *See also* **'Activated Alkaloids.'**

B P1 **"Sterules" of Cocaine Hydrochloride, Sodium Bicarbonate and Chloretone (Dry Powder)** contain the constituents to produce 1 ounce of the injection on dissolving in distilled water.

B P1 **Compound Cocaine Suppository** of Cocaine $\frac{1}{6}$ grain with Morphine $\frac{1}{4}$ grain (Hydrochlorides) is useful for painful hæmorrhoids.

B P1 **Tabellæ Cocainæ,** Cocaine Tablets, $\frac{1}{8}$, $\frac{1}{10}$, and $\frac{1}{20}$ grain with chocolate. The usual dose is $\frac{1}{20}$ grain.

Dose.—1 every quarter, half-hour or hour, quickly eaten and swallowed. Useful for sea-sickness (chloroform or alcoholic sickness) and that of pregnancy.

Sea-sickness may be overcome by internal use of the following:—Cocaine Hydrochloride 0·2 Gm., Iodine Tincture 2 Cc., Water to 150 Cc.—*Dose,* 1 tablespoonful 2 to 4 times daily. More palatable without the Iodine.

B P1 **Pastilli Cocaini Hydrochlorici**, P. Jap. IV.

Contain Cocaine Hydrochloride 0·005 Gm. (1/12 grain) with Milk Sugar 0·245 Gm. (4 grains approx.) in each.

B P1 **Syrupus Cocainæ.** Hypodermic injection of Cocaine Hydrochloride (*B.P.* '14) 44 minims, Syrup of Orange Flower to 1 ounce. *Dose.*—1 drachm=$\frac{1}{4}$ grain.

B P1 **Trochisci Cocainæ Hydrochloridi.** $\frac{1}{12}$ grain (**0·005 Gm.**) in each. **T.H.** has $\frac{1}{10}$ grain.

Brompton H. 1/6 grain in 20 grains.

D P1 **Cocaine Hydrobromide also Hydriodide, Sulphate** (deliquescent), and **Lactate** (white amorphous mass) are sometimes used instead of the Hydrochloride with the same dose.

D P1 **Cocaine Periodide.** $C_{17}H_{21}NO_4.3I=683·972$.

Dose.—1/40 to 1/20 grain (**0·0015 to 0·003 Gm.**) increased with care.

When made by the interaction of Cocaine Base and Iodine in suitable solvent (*cf.* Alkaloidal Periodides) this compound is obtained in dark purple crystals containing 44·3% Cocaine.

The Periodide was made in the author's laboratories (1923).

This true Periodide is of interest as, in common with others, *e.g.*, Emetine and Quinine, it *retains* its Alkaloid in the presence of Physiological Acid, but liberates it readily to Physiological Alkali (1·5% and 15·7% of the Periodide respectively to each solution).

Solubility.—Slightly soluble in Alcohol, almost insoluble in Chloroform and insoluble in Ether and water.

Incompatible with alkalis, metal compounds and otherwise as alkaloids.

Uses.—Internally, it is suggested in sickness and abdominal pain. The fact of the compound passing through the stomach practically unaltered suggests **its** possible utility in duodenal ulcer or other painful affections of the bowel. The local antiseptic action of the Iodine liberated may also be of value.

Dispensing Note.—To be given alone in cachet or 'slipule' (No. 5), preferably after food.

D P1 **Cocainæ Nitras, Cocaine Nitrate. P.G. VI.**
$C_{17}H_{21}NO_4.HNO_3=366·192$.

Dose.—$\frac{1}{20}$ to $\frac{1}{2}$ grain (**0·003 to 0·03 Gm.**)

In large colourless crystals, readily ***soluble*** in water. Is compatible with silver nitrate, and if used previously in solution lessens the pain caused by the latter salt.

D P1 **Cocaine Nitrite** is also prepared for use in an anti-asthmatic spray (*vide Tucker's Asthma Cure, Vol. II.*).

D P1 **Cocainæ Phenas.** *Syn.* **Cocaine Carbolate.**

Dose.—In pill, $\frac{1}{20}$ to $\frac{1}{2}$ grain (**0·003 to 0·03 Gm.**)

A slightly soluble pasty compound, used by dentists and given for gastralgia.

Strongly antiseptic and may be used on cut surfaces, as its coagulating effect on albumen prevents too rapid action.

D P1 **Cocainæ Salicylas,** $C_{17}H_{21}NO_4.C_6H_4.OH.COOH=441·224$.

Dose.—$\frac{1}{20}$ to $\frac{1}{2}$ grain (**0·003 to 0.03 Gm.**). Is in minute snow-white crystals, very deliquescent; it forms a solution which keeps well. ***Soluble*** 5 in 1 of water, 2½ in 1 of alcohol 90%. In spasmodic asthma, the hypodermic injection of a full dose at the beginning relieves the attack.

Uses of Cocaine and its Salts.

Besides rendering the superficial structures of the eye anæsthetic, Cocaine is a mydriatic, and paralyses the accommodation. When applied to a mucous membrane it blanches the part, and simultaneously anæsthesia occurs. The application of an ointment of the pure alkaloid, made with lard, to a surface will remove the pain of eczema, erysipelas, facial neuralgia or shingles, and the irritation of urticaria or pruritus. Burns and scalds should first be brushed over with a 4% aqueous solution of the hydrochloride, and the pure alkaloid combined with Carron oil (Linimentum Calcis), petroleum cerate, or boric acid ointment, afterwards applied on cotton wool or lint. For fissured nipples, or stings and bites of insects an aqueous solution may be applied. The irritability of inflamed mucous surfaces, as in hay-fever, influenza, coryza, bronchitis, spasmodic asthma, laryngitis, and pharyngitis, is much relieved by the spray of a watery solution of a cocaine salt. Spasmodic and painful affections of the vagina, causing dyspareunia and vaginismus, may be minimised by vaginal injections of a quarter of a grain of cocaine in 1 per cent. oily solutions. In dentistry, it is useful in toothache. The alkaloidal base, being only slightly soluble in water, is less liable to be washed away by the saliva. If a little be inserted in the cavity of a carious tooth and covered with a plug of wool soaked in chloroform of mastiche all pain is obtunded for a considerable time. A strong solution in oil of cloves is also useful. In extraction the **Dental Anæsthetic** will be found effectual. A strong aqueous solution of the hydrochloride may be painted on the surrounding gum as an alternative or supplement.

Solutions of cocaine hydrochloride have been employed topically in excision of the tonsils, cauterizing the turbinated tissue of the nose, painting chancres previous to the application of nitric acid or other caustics, opening abscesses, removing polypi, and many cases of iridectomy and operation for cataract, squint, and the removal of foreign bodies from the eye. For the eye sterile aqueous solutions of the hydrochloride of cocaine of mostly 2, or up to 4% are used, and for other purposes from 4 to 20 or even 50%; of the weaker solutions it is necessary to repeat the application three to five times at intervals of three to five minutes.* Normal saline solution may be used as a vehicle for the ophthalmic solution with advantage. No operation should be commenced within at least ten minutes of the first application. Injurious effects, either local or constitutional, rarely follow its use.

Cocaine is a stomachic, useful after excess either in eating or drinking, in distaste for food, in sea-sickness and vomiting of pregnancy, or from other causes—the **Tabellæ *antea* are suitable.**

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* The *nose* may be plugged with strips of gauze soaked in 20% Cocaine Solution, to which a few drops of 1 in 1,000 Adrenalin have been added. In the *urethra*, not exceeding 1% should be used, as absorption is rapid. In the eye 1 to 4%. There is no drug to equal Cocaine in potency as a local anæsthetic.—H. S. Souttar, B.M.J. ii./13,70.

When using Cocaine in nose operations patients should be warned to get a full meal before the operation. If this be done, Cocaine is safer than Chloroform or Ether.—B.M.J. ii./13,737.

For small operations, *e.g.*, finger amputation, Cocaine Solution 5%, to which 5 m. of Carbolic Acid and 5 m. of Suprarenalin Solution 1—1,000 have been added to each ounce of the solution, never exceeding 90 m., often less of this. Use a Cresylic Disinfectant to cleanse, and then paint over the affected parts with a 1% solution of Iodine made with Alcohol 90%.—Pr. Mar. 1912

Rectal and prostatic pains are relieved by ½-grain suppositories. A rectal injection checks diarrhœa and dysentery.

Cocaine is regarded as a general protoplasmic poison. It stops the movement of spermatozoa and white corpuscles Has a special affinity for nervous tissue.

Whooping Cough often well treated by Cocaine by the mouth, *dose* being on the basis of 1 grain *ter die* for an adult —L. i./09,35.

Also of value by painting the external auditory meatus and membrana tympani with a pigment. P Pl **Pigmentum Cocainæ et Hydrargyri Perchloridi.** Cocaine Hydrochloride 28 grains, solution of Mercuric Chloride 20 drops, Glycerin 4 drachms, Water 4 drachms, after syringing ears twice **or thrice daily with Boric Acid lotion.**

For hay fever, Herbert Tilley warns that it may generate Cocaine craving.

In eye work as a local anæsthetic Cocaine has not been replaced —L. i./13, 688; Pres. June, 1913,197.

For excision of an ingrowing toenail, which he performed radically himself, a medical man injected 4 grains of Cocaine in two hours Satisfied with Cocaine. It was found that a small initial dose may produce faintness Lay patient down to recover, then proceed with ordinary dose. The first faintness is common.—H. B. Blackburn.

Cocaine 5 Gm. instead of 0·5 Gm. injected into a horse's fetlock. Operation performed. Sweating after about three hours but no violent Cocaine poisoning. Subsequent recovery.—P.J. i. 15,109.

Snake bite well treated by large dose—*vide* Snake Bite, Therap. Index.

Deflection of septum operations. Pledgets soaked in Adrenalin solution and 10% Cocaine Hydrochloride ,equal parts, then Cocaine injections (5%) into the muco perichondrium.—J. Donald, Pr. April, 1921.

For ear operations as local anæsthetic.—Cocaine Hydrochloride, Menthol, Carbolic Acid, Clove Oil, and Rectified Spirit, equal parts.—F. Pearce Sturm, B.M.J. ii./26,638.

Enucleation of the tonsil **under local anæsthetic. For surface anæsthesia a mixture of equal quantities of 10% Cocaine Hydrochloric Solution and Adrenalin Solution used, applied with cotton swabs, and repeated three or four times, followed by infiltration of the tissues, in which the tonsil lies** embedded, with a 5% Novocain Solution.—Dan McKenzie Pr. May 22/314.

None of the synthetic local anæsthetics equal Cocaine when applied to mucous membrane. Operations should be preceded by Morphine and Atropine hypodermically. In nose operations *Adrenalin* should be applied followed by Cocaine; injection being made slowly.

In throat operations a 5 to 10% solution should be applied first.

When there is suspicion of possible danger, one fourth of the anæsthetic only should be used and the patient watched for possible toxic effects. Soluble tablets of Cocaine recommended to allow of solutions being as fresh as possible. —COMMITTEE APPOINTED BY AM. MED. ASSN.—Jl.A.M.A., July 31,'20, p. 315, Pres. Feb. '21, p. 39.

As a result of comparative tests Cocaine, on the whole, was found preferable to Butyn for aural work.—L.ii./23,1298.

Cocaine anæsthesia stated to be increased by the addition of **Potassium Sulphate.**—Y.B.P., '24,316. *cf.* Note to Potassium Sulphate and to Stovaine.

None of its rivals appears to have any material advantage over Cocaine.—E. Watson-Williams, Bristol Med. Chir. Jl., Autumn '25,164, per Pres., April '26,146.

Better than substitutes, especially in eye work and rhinology.—A. J. Copeland, B.M.J., ii./24,41.

Local Infiltration Anæsthesia is produced by solutions of cocaine (and eucaine, *q.v.*) used by subcutaneous injections made along the lines of proposed incisions, and then into deeper parts before cutting them, and into the sheaths of nerve trunks to annul sensation in parts of limbs, &c. Its action commences in three minutes, increases for ten to twenty minutes, and mostly disappears within half an hour. The anæsthesia may be prolonged by applying a triangular bandage when possible above the site of injection; this has also the advantage of lessening the risk of toxic symptoms, as the delay of cocaine (and eucaine) in the tissues renders it innocuous, either by fixing it there or destroying it locally. **Cocaine and Adrenalin** are used together—the addition of the Adrenalin (*q.v.*) arresting the bleeding. (**Sterules** of the two are prepared.)

For infiltration a 0·01% solution of Cocaine with 3 to 5 drops of Adrenalin solution 1 in 1,000 to each 100 Cc. is sufficient.

The use of Cocaine and Adrenalin has been advocated for anæsthetising the urethra by swabbing with a plug of cotton wool soaked with 1 Cc. of a 1% solution of Cocaine Hydrochloride to which 3 drops of a 1 in 1,000 solution of Adrenalin have been added.

Cocaine Hydrochloride Solution, 0·5 or 0·25%, with the addition of 3 minims of fresh Adrenalin Chloride Solution (1 in 1,000) to 100 Cc. of Cocaine Solution has been used for skin grafting, excision of small tumours, circumcision, abscesses, whitlows, etc., empyema (specially good results), operations on fingers and toes and fistula in ano.

Experimentally, an anæsthetic dose of Cocaine or Novocain has *no effect on the heart*, but with Adrenalin added the heart's action becomes slower and diminished in intensity. Hypertonic injections may be the cause of after-pain.—F. N. Doubleday, L. i./25,437,451.

In gynæcological work Cocaine Hydrochloride as **Dusting Powder**—on cotton wool swabs has been used with good results. Is found to be better than Solutions.

Lumbar Puncture Anæsthesia with ½% solutions, is occasionally practised for major operations. Further details 17th Edn., p. 328.

Cocaine Ionisation, *see* Iontophoresis, Vol. II.

P1 Tropacocaine. *Syn.* BENZOYL-PSEUDO-TROPINE.

Obtained from Java Coca. The **Hydrochloride** (P.G. VI.) $C_8H_{14}NO.C_6H_5CO.HCl=281·625$ is freely *soluble* in water, has M. pt. 271° C., and is a powerful anæsthetic; aqueous solutions keep well; in the eye causes neither ischæmia nor irritation of hyperæmia. 3% solution recommended; anæsthesia quicker than with Cocaine, but more transitory; the action may be kept up by adding a drop from time to time. Mydriasis occurs occasionally but is slight. Injection into gums in large doses only affected pulse for 10 minutes and did not affect respiration. Aqueous solutions can be boiled with impunity.

Three drops of 5% solution are sufficient for anæsthetising the eye, *e.g.* for removing a foreign body.

Sciatica (severe) Tropacocaine 1 Cc. of 5% solution injected into the dural sac in the lumbar region—the nerve exposed by incision and forcibly stretched with the finger. Complete cure and not the slightest recurrence of pain.—B.M.J. i./08,23

Ⓟ **Tablets (Hypodermic)** contain $\frac{1}{30}$ grain.

Intraspinal Anæsthesia by Tropacocaine.

For operating in hernia, fistula, hæmorrhoids and amputations.

Ampoules containing 1·5 Cc. (25 minims) of 5% Neutral Solution in Normal Saline—Sp. Gr. 1·016—employed, *i.e.*, 20 minims of this solution is suitable for a healthy person weighing about 11 stone. *Maximum dose* 24 minims. For a child 1 year old 4 minims is enough. After a lapse of 40 to 50 minutes a second injection of 8 to 12 minims is given if required. 1,295 cases treated with this method at Queen's Hospital, Birmingham.—J. T. J. Morrison, B M.J i /13,1306.

Benzamine Hydrochloride, *Syn.* **Betacaine, *Eucaine Hydrochloride, U.S. X.** Eucaine or Eucain B., Benzoyl-vinyl-diacetonalkamine or Trimethyl-benzoxy-piperidin Hydrochloride, P.G. V. (not in P.G. VI). P. Helv.

$C_5H_7N(CH_3)_3(C_6H_5COO).\ HCl = 283{\cdot}646.$

TRADE MARK: EUCAINE, 193242 of 1896. Registration renewed 1924.
PATENT: 20697 of 1896. Became void in the twelfth year. Now public property.

Dose.—$\frac{1}{10}$ to $\frac{1}{2}$ grain (**0·006 to 0·03 Gm.**) or more.

A synthetic compound allied to Cocaine, in small white opaque crystals, ***soluble*** about 1 in 30 of water (Crystals may deposit on cooling which can be redissolved without harming the salt). 2% solutions are used in ophthalmic work (**Guttæ R.O.H.** 2 or 5%). They may be boiled without decomposing the salt.

Sterules, Hypodermic contain Eucaine $\frac{1}{4}$ and $\frac{1}{2}$ grain. For dental extraction.

Local Infiltration Anæsthesia (*Barker*) with Eucaine is suitable for very short operations:—

Eucaine and Sodium Chloride Sterules are prepared for producing the 2 in 1,000 solution for infiltration, containing Eucaine 3 grains (**0·2 Gm.**) and Sodium Chloride 12 grains (**0·8 Gm.**) to produce $3\frac{1}{2}$ ounces (**100 Cc.** approx.) of solution. This is **isotonic.**

The solution is boiled and on cooling 10 minims of Adrenalin Solution may be added. In the operation 50 Cc. or more (up to 100 Cc.) is injected all round the region to be dealt with. *See also* **Barker's Stovaine Glucose Solution.**

Nebula Eucainæ.

Eucaine 10 grains, Sodium Sulphate 4 grains, Distilled Water 1 ounce. **Ophthalmic Lamels** contain $\frac{1}{100}$ and $\frac{1}{50}$ grain.

Adreucaine Sterules contain Eucaine $\frac{1}{12}$ grain and Adrenalin $\frac{1}{4000}$ grain in 8 minims ($\frac{1}{2}$ Cc.), for dental and surgical use. For tooth extraction the contents of one (or two) sterules are injected into the gums ten minutes before operating.

Tablets of Eucaine are made $\frac{1}{10}$ grain (**0·006 Gm.**) for internal **use.**

Unguentum Eucainæ.

Eucaine 1, Olive Oil 2, Hydrous Wool Fat 7. For pruritus, Menthol 2% may be added.

Benzaminæ Lactas (*B.P.* '14). *Syn.* EUCAINÆ LACTAS.

$C_{15}H_{21}O_2N.CH_3CHOH.COOH = 337{\cdot}224.$

Dose.—$\frac{1}{8}$ to $\frac{1}{2}$ grain. (**0·008 to 0·03 Gm.**).

A white crystalline salt with M. pt. 155° C.

Soluble about 1 in 5 of water and about 1 in 8 alcohol (90%).

Incompatible with salicylic acid.

For ophthalmic work and in dentistry employ 2 to 3%; for infiltration 0·1% with Sodium Chloride 0·8%; for regional anæsthesia 2·5%; nose, throat and ear 10 to 15%. Solutions can be boiled.

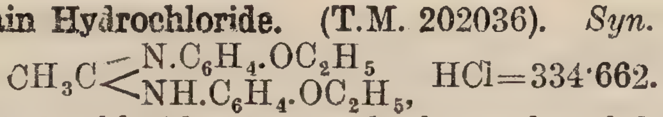
Slower in action than cocaine, less toxic, and anæsthesia more prolonged, while the heart is not affected, nor the pupil dilated.

Sciatica has been treated by injections.

Urethral Injection. 1 to 2% solutions may be used to relieve pain.

Sterules (Hypodermic) of **Eucaine Lactate** ¼ grain (**0·016 Gm.**), also ½ grain (**0·03 Gm.**)

✱Holocain Hydrochloride. (T.M. 202036). *Syn.* **Phenocain.**



$$CH_3C\begin{matrix}{=}N.C_6H_4.OC_2H_5\\ {-}NH.C_6H_4.OC_2H_5,\end{matrix}\ HCl=334{\cdot}662.$$

The Hydrochloride of para-diethoxyethenyl-diphenylamidine in small colourless shining crystals.

Soluble 1 in 55 of water. ***Incompatible*** with Alkalis.

As an anæsthetic in ophthalmology, 2 to 5 eye drops of 1% solution, but it is *not adapted for hypodermic use.*

Sterules of Holocaine Hydrochloride Solution 1% are prepared.

Alypin. (T.M. 322518. Removed by order of Court). *Syn.* **Amydricaine, Benzoyl-tetramethyl-diamino-ethyl-di-methyl-carbinol Hydrochloride.** P.G. VI.

$C_6H_5COC_2H_5CO.[CH_2N(CH_3)_2]_2HCl=314{\cdot}689.$

Dose (Internally).—$\frac{1}{20}$ to ½ grain (**0·003 to 0·03 Gm.**).

Crystalline powder melting at 169° C. ***Soluble*** in Water 1 in 1 and 1 in 4 Alcohol 90%.

Solutions 0·025 to 0·5% or up to 10% (strong solutions keep well, but weak ones may become cloudy ; may be sterilised by boiling), efficient in eye work.—2% strength produces insensibility of cornea in sixty seconds. Non-toxic. It produces no mydriasis nor disturbance of accommodation.

For lumbar anæsthesia has been used in ¼ to 1 Cc. injections of 2% solution.

For infiltration 0·01 to 0·1% solution has been used with same quantities of Cocaine Hydrochloride in 0·2% Sodium Chloride Solution.

In sickness and post-operative vomiting internally it acts like Cocaine.

Alypin Nitras. P.G. VI. Is compatible with Silver Nitrate.

Has vasodilator action, not constrictor like Cocaine.

Alypin Tablets, ⅓ grain, dissolved in 1 Cc. water produce a 2% solution suitable for use in *dentistry* and minor surgery, and for eye work (also made **with Suprarenin 1/5,000 grain)** ; **2 drops of 'Adrenalin' may be added.**

Tablets, ⅚ grain, dissolved in 1 Cc. produce a 5% solution suitable for *local anæsthesia* and for nose, ear, **throat and urinary tract (also made with Supra**renin Borate 1/2,000 grain).

Tablets, 3⅓ grains, dissolved in 1 Cc. produce a 20% solution for *anæsthetising* surfaces by local application (also **made with** Suprarenin Borate 1/2,000 grain)

Injectio Alypin cum Suprarenin R.O.H. — Alypin 1, Suprarenin 0·0025, Sterilised Distilled Water to 100.

Alypin in 10% solution more toxic than Cocaine of the same strength.—L. ii./23,1300.

Aminobenz, '✱Orthoform, New,' the Methyl ester of *Meta*-amido-*para*-oxy-benzoic Acid (Methyl-amino-oxybenzoate P. Helv.).

$C_6H_3.NH_2OH.CO.OCH_3=155{\cdot}08.$

T.M. : ORTHOFORM, 215951/1898. **since renewed.**

PATENTS : 12,179/1897 and 22,106/1898. Both ***Expired.***

Manufacture.—The following **steps are involved :**

Oxidise *p*-Nitro-Toluene with Chromic Acid and Sulphuric Acid to *p*-Nitrobenzoic Acid. Reduce this to *p*-Aminobenzoic Acid. Diazotise with Sodium Nitrite and Hydrochloric Acid and heat to form *p*-Hydroxy-Benzoic Acid. Convert this into its Methyl-Ether by means of Methyl Alcohol and Hydrochloric Acid Gas. Nitrate with Nitric and Sulphuric Acid mixture to produce *m*-Nitro-*p*-Oxy-Benzoic Methyl Ester and finally reduce to the *m*-Amino compound.

Note.—**The reductions are the principal difficulties. As reducing agents worthy of consideration are** Sodium Disulphide **and Sodium Hydrosulphite.**

Dose.—1½ to 3 grains (**0·1 to 0·2 Gm.**) for stomach ulceration.

A white crystalline powder, possessing local analgesic and antiseptic properties. Is slightly soluble in water, in alcohol 90% 1 in 7.

The **Hydrochloride** $C_6H_3.OH.NH_2COOCH_3,HCl=191{\cdot}575$ is soluble about 1 in 9 of water; action of base is more prolonged.

A 10% aqueous solution of the hydrochloride is used, or 10 to 20% with lanoline or paraffin ointment or collodion solution of pure orthoform, or this as a dusting powder, may be employed to alleviate pain in sores or burns, but has little action unless there is a breach of surface.

Has relieved whooping-cough and laryngeal tuberculosis by insufflation.

Insufflatio Orthoformi cum Resorcin. C.L.T.E. Resorcin 2½ drachms Orthoform to 1 ounce.

Orthoform Bougies 5%, 4 inches in length with Cacao Butter basis, are prepared.

*__Kerocain__ (T.M. 373550). *Syn.* *NOVOCAIN. Procaine, **Para-Amino-Benzoyldiethyl-Amino-Ethenol Hydrochloride.** FR. CX. Supp. 1920, Ph. Ital. IV., P. Jap. IV., P. Argent. II., P.G. VI., Ph. Ned. V., P. Svec. X. ETHOCAINE, PROCAINE HYDROCHLORIDE U.S. X.

*AETHOCAINE is T.M.389240.

$C_6H_4\ (NH_2)\ [CO_2.C_2H_4N.(C_2H_5)_2]\ HCl=272{\cdot}641.$

Dose, subcutaneously.—$\frac{1}{5}$ to 1 grain **(0·012 to 0·06 Gm.).**

Max. Single Dose per os (FR. CX. Supp., 1920) 0·1 Gm. (1½ grains); *Max. during 24 hours* 0·25 Gm. (4 grains).

TRADE MARK 'Novocain' No. 276477. Permission to use granted to British firm. 'Suspension in favour of.'—C.D Oct, 20/17, p. 890

A licence to use the enemy patents (*vide* 17162/1905) was also granted to a British firm. This patent is not in the process of manufacture but in the production of a compound of therapeutic value.—C.D. i./16,653. It has now lapsed.

So far as we are aware there is only one British firm making the compound.

A colourless crystalline salt melting at 156° C. Soluble 1 in 1 of water. In absolute Alcohol 1 in 30 nearly (by experiment). A cocaine substitute. 0·25 to 2% solutions are for hypodermic use.

Incompatible with Alkalies, Tannin, Calomel, Potassium Dichromate, Potassium Permanganate and Silver Salts. With the latter use Novocain Nitrate, *s.a.*

Uses.—**A powerful local anæsthetic, but its effect is very transient. A drop of 5% solution anæsthetises the conjunctiva sufficient** for superficial operations. It is well tolerated by the tissues, but has been called a poor substitute for cocaine.

Infiltration Anæsthesia has been practised by 200 Cc. of 0·5%. Solution in Normal Saline—a maximum dose—this is sufficient to anæsthetise the area for most operations. 50 to 75 Cc. is enough for a moderate size elbow. 150 Cc. for a knee.

The following **Tablets** are prepared with addition of Adrenalin:—

(A.) For Infiltration Anæsthesia of Thick Layers of Tissue and Hypodermic injections in General Surgery.

Novocain 0·125 Gm. Adrenalin 0·000125 Gm.

Dose.—One tablet dissolved in 25 Cc. Normal Saline Solution makes a ½% Novocain Solution. *Max. dose.*—125 Cc.

(B.) For Anæsthesia of Nerve Centres and Larger Nerves (Local Anæsthesia.)

Novocain 0·1 Gm. Adrenalin 0·00025 Gm.

Dose.—One tablet dissolved in 5 Cc. Normal Saline Solution makes a 2% Novocain Solution. *Max. dose.*—5 Cc.

(C.) For Spinal Anæsthesia.

Novocain 0·05 Gm. Adrenalin 0·000083 Gm.

Dose.—One tablet dissolved in 1 Cc. Normal Saline Solution makes a 5% (Isotonic) Novocain Solution. One to 3 Cc. may be used.

(D.) Without Adrenalin.

Novocain 0·2 Gm. Sodium Chloride 0·09 Gm.

Dose.—One tablet dissolved in 10 Cc. sterile distilled water makes a 2% Novocain Solution.

(E.) Dental Tablets.

Novocain 0·02 Gm. Adrenalin 0·00005 Gm.

Dose.—One tablet dissolved in 1 Cc. Normal Saline Solution makes a 2% Novocain Solution. 1 to 2 Cc. for one or two extractions.

NOVOCAIN DENTAL SOLUTION (2%). ***Dose.*—1 to 2 Cc. is also prepared :—**

Novocain 0·02 Gm. Adrenalin Solution (1 in 1000) 1 drop. Sodium Chloride 0·006 Gm. Thymol 0·0006 Gm.

(F.) Without Adrenalin.

Novocain 0·05 Gm.

One tablet dissolved in 1 Cc. Normal Saline Solution gives a 5% Novocain Solution.

Fischer's Modification of Ringer's Saline Solution (*q.v.*) is sometimes used instead of Normal Saline Solution for the above. Kerocain may replace Novocain.

Atropine is the best drug to combine with Novocain and Adrenalin to ***prevent the effects of Adrenalin*** poisoning. Adrenalin has a definite depressant action on the heart.—F. N. Doubleday, B.M.J., i./25,455.

In general anæsthesia, local infiltration of the operation area with Novocain is very important.—J. Ross Mackenzie, L. i./27,165.

Injectio Novocainæ cum Suprarenin, R.O.H.—Novocain 1 or 2, Suprarenin 0·00125, Sterilised Distilled Water to 100.

Dose.—*Up to* 1 drachm of the 2% ; *up to* 2 drachms of the 1%

In eye work may be employed, *e.g.*, for excision of the lachrymal sac, and for other minor operations.

Toxic symptoms during use of Novocain. 2 drachms of 1% Solution with ¾ minim of 1 in 1,000 Adrenalin Solution caused the pupils to be widely dilated and fixed. Consciousness had gone and a cold, clammy sweat broke out. Pulse slowed, body became rigid for fully a minute. Recovery with Strychnine. —L i./13,561. Death from use in dental work —B.M J. ii /10,2052.

Solutio Ethocainæ, St. Th. H. ½ to 10% in Saline.

Solutio Ethocainæ Composita, St. Th. H. *Syn.* DUNHILL'S SOLUTION. **Ethocaine 3 grains, Adrenalin Solution 7½ minims, Normal Saline Solution to 3½ ounces.**

Solutio Ethocainæ et Adrenalini, St. Th. H.

Ethocaine 4, Adrenalin Solution 10, Water to 100.

Sterules, Hypodermic of Novocain, ⅓ grain (0·02 Gm), also **Novocain** ⅓ grain (0·02 Gm.), **with Adrenalin** 1/1,000 grain, are prepared.

Toxicity and destructive power on tissues much less than of Cocaine.—B.M.J. ii. /09,783. On the other hand one reads :—

Novocain-Suprarenin Spinal Anæsthesia.—In 63 cases, three of incomplete anæsthesia, six in which Ether had to be used, one of collapse and another of "air hunger."—L. ii./13,1854 ; *see also* Pr. 1911,240.

Novocain with Strychnine is also employed for producing spinal analgesia.

Regional Anæsthesia is a form of local anæsthesia, using a stronger solution than that for local infiltration. A small quantity is introduced round the nerve trunks, which supply the parts to be operated on at some part of their course, which is anatomically accessible. This form of anæsthesia has been effected with a Solution of Novocain 2, Sodium Chloride 0·5, Distilled Water 100 Five drops of a 1 in 10,000 Solution of Adrenalin are added to each 20 Cc. of Solution immediately before use.—For Technique *vide* Felix Rood, B.M.J. ii./12,1701.

Supraclavicular Anæsthetization of the brachial plexus with 20 Cc. of 2% Novocain Solution, with addition of Adrenalin. Stated to be convenient and free from danger. By its use severe operations on the arm can be performed painlessly and without shock. Definite paræsthesia must be obtained in the arm and hand before the injection is made.—B.M J i./13,388.

Regional anæsthesia with Novocain.—C. Hope Carlton, B.M.J., i./25,647.

Warning against use of Epinephrin with Procaine in local anæsthesia.—Paris Med., Oct. 17,'25, per Jl. A.M.A., ii./25,1762.

Regional anæsthesia with Novocain. Methods described. The multiplicity of punctures necessary, Novocain intolerance, and the psychic factor, are disadvantages, but the technique is regarded as a life-saving measure in the surgery of the old and feeble, and those with cardiac, renal, or pulmonary disease, or diabetes.—Stanford Cade, L. i./25,856.

Of particular value for operations on the thyroid and thorax.—L. i./25,879.

Splanchnic analgesia with Novocain. Advantages are perfect relaxation of the abdominal wall with less shock and fatigue to patient. Disadvantages are the extra 15 minutes time to anæsthetise patient and in some cases post-operative head and backache. Operations may be performed which would not be attempted under general anæsthesia alone.—O. S. Hillman and R. E. Apperly, L .i./25,863.

Intra-arterial anaesthesia, by 50 to 100 Cc. of 0·5% Novocain into an artery, circulation being arrested by a tourniquet. Analgesia develops in 1 to 2 minutes – B.M.J. ii./13,392.

Spinal Anæsthesia with Novocain. 5% solution with Mannitol. Dose varied from 0·06 to 0·08 Gm. of Novocain. No safer than Stovaine and larger dose has to be used.—C. C. Holman, L. i./16,955.

Novocain ¾ Gm., Magnesium Sulphate ½ Gm., in water or saline 100 Cc. Boil and when cold add Adrenalin solution 1 Cc. to each 30 Cc. This amount is usually enough to completely anæsthetise wound area—cranial injuries in war.—J. Anderson, B.M.J. ii./17,42.

Kerocain and Cocaine solutions with Adrenalin in concentrated form for dilution a convenient number of times, *e.g.*, 1 : 40 satisfactory in use. A 15% Sodium Chloride solution is bactericidal; with addition of 7½% Cocaine is slightly less bactericidal and with 7½% Kerocain is still less.—H. Macnaughton Jones, L. i./18,904.

Intrasacral extradural injection of Novocain. A new method for operations on hæmorrhoids, fistulæ, and other conditions in and about the anus.

Dose.—20 Cc. of 2% Novocain to which five drops of 1 in 1000 Adrenalin solution is added—the amount of Novocain thus exceeds 6 grains. 15 grains have been used in a local or regional anæsthesia and even 35 grains have been used.—S. R. Meaker, B.M.J. i./19,569.

If kept sterile and out of contact with air, Novocaine solutions will keep unchanged indefinitely.—M. L. Bonar, Pres. Dec. 23,413.

Local anæsthesia in operations on the anal region effected by injection of solution consisting of Novocain 2%, Adrenalin (1 : 1,000) 1% and Phenazone (Antipyrin) 1%. An average injection of 2 ounces, preceded by hypodermic injection of Morphine 1/8 grain and Hyoscine Hydrobromide 1/200 grain.—E. G. Martin, per Pres. April '23,147.

RECTAL OPERATIONS.—A 1 or 2% solution of Novocain satisfactory.—B.M.J.E., i./25,19.

Sterules of Novocain 0·15 Gm., Caffeine 0·12 Gm., Sodium Benzoate 0·15 Gm. in Sterile water 3 Cc.

Dose.—2.5 Cc. of the contents.

In spinal anæsthesia the depressing effects have been prevented by the use of Caffeine. The amount should not be sufficient to mask the effects of the drug.

A case is reported in which a man of 71 who collapsed whilst undergoing prostatectomy under spinal anæsthesia, recovered on the injection of 0·25 Gm. Caffeine into the spinal subarachnoid space. 15 minutes' artificial respiration had been unsuccessful.—M.P.C. Mar. 14/23, p. 208.

Novocain Suppositories, 1½ grains (0.1 Gm.) in Cacao Butter 30 grains are prepared.

Novocain, Identification of, see Vol. II.

✱Borocaine. *Syn.* ETHOCAINE BORATE. $2(C_{13}H_{20}N_2O_2).5B_2O_3.4H_2O$.

PATENT.—The manufacture of this compound and also of the borates of other anæsthetic bases is covered by Patent No. 260346 (Sir William Pope), application date July 28th, 1925.

The compound was first investigated by Gros, who noted its increased anæsthetic action compared with other Novocain salts.—Arch.f.exp.Path.u. Pharm., 1912,132.

Criticism of the Patent. Possibly the use of Acetone in combining the constituents is a novelty. Collins gives formula $C_{13}H_{20}O_2N_2.5HBO_2$, Jl. A.M.A., Jany. 7/28; L. i./28,512.

TRADE MARK.—No. 465,359.

Dose.—1/3 to 1½ grains (**0·02 to 0·1 Gm.**). Tablets contain 0·1 Gm. with Adrenalin 0·00025 Gm., Sodium Chloride and Glucose. One in 5 Cc. makes a 2% solution, and in 2 Cc. produces a 5% solution.

Uses.—For operative work on the eye, for dental use, for operations on and examination of the urethra and bladder, and for surface anæsthesia in general, 2% solutions are used, and for operations on the nose and throat 5% solutions. (Beta-Borocaine, *v. postea*, is stated to be a better surface anæsthetic.)

Borocaine was introduced as a substitute for Cocaine. Although a salt of Novocain base it is stated to be more active but less toxic than Novocain. The difference in properties is due to the fact that Borocaine, being the salt of a weak acid, in solution yields free alkaloidal base by hydrolysis (see "Activated Alkaloids").

Factors concerned in surface anæsthesia. An account of the borates of some anæsthetic bases ("borocaines").—A. J. Copeland and H. E. F. Notton, B.M.J., ii./25,547.

A 2% solution of Borocaine is an improvement on a 0·5% solution of Cocaine, in urethral anæsthesia, and a 1% solution of the former gives better anæsthesia than a 0·5% solution of Cocaine, but a 0·5% solution of Borocaine has no advantage over a 0·3% solution of Cocaine. Beta-eucaine Borate in 0·5% solution is a perfect urethral anæsthetic and the relaxation is perfect. In ¼% its action is equal to ½% Cocaine HCl, but ⅛% is not so good as ½% Cocaine.—R. Coyte, B.M.J., i./26,85.

OPHTHALMOLOGY.—Borocaine greatly inferior to Cocaine as regards surface anæsthetic effect. Cocaine is perfectly reliable, whereas the effect of Borocaine is variable.—T. H. Butler and R. U. Gillan, B.M.J., i./26,84.

✱Beta-Borocaine. *Syn.* BETA-EUCAINE BORATE.
$C_{15}H_{21}NO_2.5HBO_2$.

PATENT: See Borocaine. TRADE MARK: NO. 465359.

Dose.—3/8 grain (**0·025 Gm.**).

Uses.—A *surface* anæsthetic: Borocaine is preferred for *injection.*

For operative work on the eye, a 0·25% solution is recommended, and for operations on and examinations of the urethra and bladder in general a 0·5% solution is suitable.

Beta-Eucaine Borate has three times the anæsthetic action on the rabbit's cornea, and 1/10 the experimental toxicity of Cocaine Hydrochloride. It is mildly irritant, causes some congestion, especially in the nose, and in very large doses excites the central nervous system.—A. J. Copeland, B.M.J., i./26,82.

Beta-Borocaine Tablets contain 0·025 Gm., with Adrenalin 0·00005 Gm., Sodium Chloride and Cane Sugar *q.s.* One dissolved in 10 Cc. makes a 0·25% solution: one in 5 Cc. makes a 0·5% solution.

Allocaine Lumière is a preparation chemically identical with Novocain. It is used in conjunction with Adrenalin.

Allocain S.—Ethyl-Mydriatine Hydrochloride. A new local anæsthetic stronger than Novocain and weaker than Cocaine. On account of the slight irritation caused by its acid solutions and of precipitation by tissue fluids its use is limited. Adrenalin, Ephedrine, Mydriatin are allied chemically.—S. Kubota, Jl. Pharm. and Exp. Therap., Feb. 1919.

Anesthone—ETHYL PARA-AMINO-BENZOATE. U.S. X., P.G. VI., PH. NED. V.; PARA-AMIDO-ETHYL BENZOATE; BENZOCAINE. *ANÆSTHESINE (T.M.: 244958/1902, since renewed). $NH_2.\ C_6H_4.\ COO.\ C_2H_5=165{\cdot}096$.

Dose.—3 to 8 grains (**0·2 to 0·5 Gm.**) in powder or cachets.

Manufacture.—Prepare *p*-Nitro-Toluene by adding slowly Nitric Acid (Sp. Gr. 1·4) 105 and Sulphuric Acid 175 to Toluene 100, keeping the temperature of the mixture below 20° C. The product contains about 35% of the *para*-body, the remainder being mostly *ortho*- (with very small amount of *meta*-).

The *para*- compound is separated by cooling to 5° C. in a freezing mixture. It separates in yellow needles, which must be removed rapidly either by centrifuge or filter pump while the temperature is low, otherwise the crystals redissolve as the temperature rises to normal.

Crystalline *p*-Nitro-Toluene 50 is now oxidised to *p*-Nitro-Benzoic Acid by boiling with Chromic Anhydride 250 and Sulphuric Acid 110 diluted with water 450. (*p*-Nitro-Benzoic acid forms yellow crystals with M. Pt. 238° C.)

The next step is to reduce with Iron and Hydrochloric Acid to *p*-Amino-Benzoic Acid and finally convert into the ethyl ester by dissolving the body in absolute Alcohol and passing dry Hydrochloric Acid into the solution.

Note.—PATENT 16,684/1903 lapsed in 1908.

The compound is almost insoluble in water, ***soluble*** 1 in 8 of alcohol 90%, also 1 in 50 of Olive Oil, and easily in Ether, and Chloroform. M. Pt. 90 to 91° C. Has a numbing taste.

To relieve hyperæsthesia of the stomach and dyspepsia: local insufflations for pharyngeal and laryngeal affections, bougies for urethritis 3 grains, and suppositories 10 grains for hæmorrhoids. Ointments 10% for burns, eczema, and intertrigo.

Pneumococcic (and tuberculous) infection of the throat—in a case of difficulty in swallowing has been greatly relieved by applications of Anæsthesine dissolved in Palm Oil—in form of a spray.

***Rhinoculin (T.M. 308800) Cream, Powder and Spray contain Anæsthesin, Paranephrin, Subcutin, Glycerin and Boric Acid, for use in hay fever.—Gehe.**

Anesthone Cream.

Anesthone 10%, Adrenalin Chloride 0·005% in Ointment basis. A quantity the size of a pea applied to the nasal mucosa when necessary gives relief in hay fever and as a palliative in allaying irritation, congestion and inflammation of the nasal mucous membrane.

Anesthone Tape ½ inch wide for "packing" is also made.

***Stovaine** (T.M. 261296).—*Syn.* CHLORHYDRATE D'AMYLÉINE, FR. CX. SUPP., 1920, PH. ITAL. IV., P. ARGENT II., AMYLOCAINE, BENZOYL-ETHYL-DIMETHYL-AMINO-PROPINOL HYDROCHLORIDE.

$$C_6H_5CO.C_2H_5.CH_3CO.CH_2N(CH_3)_2.HCl=271{\cdot}641.$$

Dose.—*Per os* and hypodermically ⅓ to ¾ grain (**0·02 to 0·05 Gm.**). For lumbar anæsthesia, *dose* from ⅓ to 1½ grains (**0·02 to 0·1 Gm.**).

Max. single dose. FR. CX. SUPP. 1920.—0·08 Gm. (1⅛ grains approx.); *max. during 24 hours* 0·15 Gm. (2⅓ grains approx.).

In small white crystals, M.pt. 175° C. ***Soluble*** (by experiment) in water about 1 in 13, in alcohol 1 in 3, almost insoluble in ether.

Stovaine does not come under regulations of the D.D.A.

Uses.—Anæsthetic (2 to 4% in eye work), vaso-dilating, comparatively non-toxic. It is stated not to cause headaches, nausea, vertigo, or syncope.

For *cauterization*, 5% Stovaine found good in nose, throat, and ear work; 10% used in turbinal operations. In *septum operations* 10% with 1 in 2,000 Adrenalin. *Tonsils* removed with 1% solution, but there was much more bleeding than with Novocain. As a *laryngeal spray* for minor operations 5% solution excellent.—F. Muecke, B.M.J., ii./26,561.

NEURALGIAS in various forms have been treated hypodermically with Stovaine, *e.g.*, 1 to 2 Cc. doses of 1% Solution in 80% Alcohol along the course of the branches of affected nerves in tic douloureux.

Intraspinal Anœsthesia with Stovaine.

(A.) Stovaine-Glucose Solutions (*mainly.*)

"The ideal solution for anæsthesia should be of such strength as to be of the same osmotic tension as the blood serum. It should neither produce shrinking nor swelling of the blood or tissue cells by osmosis."

A. E. Barker employed 1 *Cc. injections of* 5% *Stovaine with* 5% *Glucose*—without any Adrenal derivative of any kind. **Often the dose may be reduced to 0·8 Cc., sometimes increased to 1·2 Cc. The Sp. Gr. of this solution is 1·0230. (Adopted by Vic. Park as Injectio Thecalis Anæsthetica.)**

Using this solution—of relatively greater density than that of the Liquor Spina is (which is 1·0070)—a small dose of the anæsthetic drug can be employed **and the severest operations can be performed. By carefully adjusting the curves of the spine beforehand to suit the purpose in hand either a high or low anæsthesia can be produced by gravitation. In the amputation of a limb, for** example, the lower of the two (whilst the patient lies on his side) can be anæsthetised whilst the upper remains entirely unaffected by the drug. The lowering of the head in any operation is not favoured. The best results are obtained by not altering the level of the body after injection, excepting in cases of the labouring class advanced in life, where the spinal column may be almost rigid —here the pelvis may have to be raised Usually 5 to 10 Cc of cerebro-spinal fluid is withdrawn before injection. Any alteration of posture may be made providing the relative levels of head and pelvis remain as before.

The equivalent of 0·06 Gm. Stovaine found to be sufficient for nearly all purposes As a rule anæsthesia was established in 5 to 7 minutes for the groins and 8 to 10 for the epigastrium. There is almost always pyrexia (rarely higher than 101° F.). In no case sign of post-operative shock Longest period of analgesia (using 0·08 Gm.) was 2 hours, largest total dose 0·135 Gm. Highest analgesia—to clavicles.

Review of 500 cases varying from severest abdominal to the most insignificant fistula in ano using Barker's Solution.—L. McGavin and R. D. O'Leary, Pr. Mar. 1912.

The canal is punctured between second and third lumbar interspaces,—patient in sitting posture. 5 Cc. of fluid allowed to escape and then the injection made. Anæsthesia within ten minutes, and lasts for about an hour. Headache following relieved by Phenacetin. Advantages—absence of post-operative shock, complete muscular relaxation, no venous engorgements or respiratory movements, no starvation, and no post-operative sickness. Contra-indicated in cases of advanced sepsis.—C. H. Allen, L. i./13,1100.

W. W. Babcock reports 5,000 cases, chiefly under Stovaine. Pre-existent shock a contra-indication to the method. Neurotics unsuited.—L. ii./13 1855.

0·9 Cc of the Solution (=0·045 Gm. Stovaine) maintains analgesia to level of the umbilicus for 45 minutes. 400 operations with good result.—Maj. J. W. H. Houghton, R.A.M.C., L. ii./12,1008.

Spinal analgesia in a variety of operations with Stovaine 0·04 Gm Sodium Chloride 0·0011 Gm., water 1 Cc. Stovaine itself is antiseptic: the solution is heated to 80/90° C. for 10 minutes —N.M. Bey, L. ii./18,141.

For abdominal operations spinal anæsthesia has very strong claims. It is a gain to have a completely flaccid abdominal wall and quiet thoracic respiration. Barker's heavy solution satisfactory.—J. Morley, L. ii./16,728. P. P. Cole *ibid* p. 645 prefers 10% Stovaine solution in Saline.

Stovaine preferred to Novocain.—F. S. Rood, L. i./19,14.

Stovaine 10% Solution with maximum dose 0·03 Gm. and without addition of Glucose in spinal anæsthesia for suprapubic prostatectomy.—H. M. Page, L. i./21,800.

Spinal anæsthesia with Barker's formula in abdominal operations.—A. H. Southam, B.M.J. ii./21,592.

For laparotomy 2 Cc. doses of Barker's formula.—S. A. Lane, L. i./23,129.

Stovaine 10% with Sodium Chloride 10%. *Dose.*—0·75 Cc.—A. Morrison, B.M.J. ii./21,1056.

Spinal anæsthesia with Stovaine 0·1 Gm., Sodium Chloride 0·1 Gm., Distilled Water 1 Cc. Results good, but a number of patients would prefer to sleep.—R. B. Coleman, B.M.J., i./25,548.

The blood pressure is always taken and the injection is never administered if it is below 100 mm. Amnesia is induced by injection of Omnopon (2/3 grain) and Scopolamine (1/300 grain) 1½ hours before operation, followed by Scopolamine (1/450 grain) after half and after one hour. The dosage of Stovaine is regulated according to the condition of the patient and intraspinal pressure (measured by a special manometer). A 10% Stovaine-Saline solution is preferred to Stovaine-Glucose, as it diffuses more rapidly, and, with debilitated subjects, or when the spinal pressure is low, a dose not exceeding 0·5 Cc. is advised. In a few cases causing anxiety the patient's condition was improved by measures taken to ***raise the blood pressure,*** viz., compression of the abdomen, raising extremities, or adoption of the Trendelenburg position, or by the use of Pituitary as a cardiac stimulant.—D. N. Kalyanvala, Edin. Med. Jl.

Give Caffeine 2 grains hypodermically as soon as Stovaine has been administered, to counteract the fall in blood pressure, and keep a second dose ready in case of emergency (the two "danger periods" are immediately after injection and 20 minutes later): Pituitary Extract a satisfactory substitute. Let the maximal dose of Stovaine solution be 0·8 Cc.—Hamilton Bailey, Pr., June, '27,372.

To prevent shock following intraspinal anæsthesia: after removal of 5 to 10 Cc. spinal fluid and the injection of anæsthetic, the spinal fluid is injected intravenously at the bend of the elbow and the operation commenced 5 or 6 minutes later.—B.M.J.E., i./27,21.

Spinal anæsthesia the ideal for urological surgery. Contraindicated in hypotension with blood pressure below 100 mm., also in extreme toxicosis, the moribund state and the presence of spinal or brain tumours.—B.M.J.E., i./27,65.

Solutio Amylocainæ St. Th. H. is 2½ or 5%.

Solutio Amylocainæ et Glucosi, St. Th. H., contains 2½ or 5% with Glucose in addition in each instance.

(B.) Stovaine-Dextrin Solution (TYRRELL GRAY).

This contains Stovaine 3%, with Dextrin, Suprarenin, &c.

The diminished toxicity of Stovaine is due to it being slowly diffusible. This property is accelerated by administering it with diffusible fluids. Dextrin is a suitable addition, it being readily soluble, and innocuous. It appears to help in controlling vomiting. It also delays absorption.

Normal Saline is also used in strength isotonic with cerebro-spinal fluid, for it has been shown that though the diffusibility of Dextrin-Stovaine Solution is above that of cerebro-spinal fluid when estimated in relation to water, yet when introduced into cerebro-spinal fluid, changes take place which make its diffusibility considerably less than laboratory experiments indicate.

Tyrrell Gray strongly advocated the method for even very young children. —B.M.J. ii./13,392; L. ii./13,554; *see also* B.M.J. ii./11,497.

1·2 Cc. of CHAPUT'S FORMULA, *i.e.*, 0·12 Gm. of Stovaine, used in error twice without ultimate serious result.—W. Sourasky, B.M.J., ii./26,524.

(C.) Ⓟ**Stovaine Strychnine Injection** (JONNESCO).

Dose.—From 0·01 Gm. Stovaine with Strychnine Sulphate ⅓ mgr, for ages 1 to 5 years, up to 0·1 Gm. Stovaine with 1 mgr. Strychnine, dissolved in 1 Cc. Sterile Water for adults.

The higher doses to be used with caution

The employment of Strychnine in conjunction was thought to render operations above the waist line safe, but the method does not show a high percentage of safety. Stovaine anæsthesia is not entirely devoid of danger.—*See also* A. A. Morrison, B.M.J. ii./21,745.

(D). **Stovaine Caffeine Injection** (JONNESCO).

Dose.—From 0·02 to 0·05 or 0·1 Gm. Stovaine with Caffeine 0·5 Gm. now preferred to the Strychnine method (*antea*). 5,000 cases.—T. Jonnesco, Press. Med. Oct. 28, 1922, p. 929.

Favourable results in spinal anæsthesia with Stovaine and Caffeine.—B. Desplas, L. ii./23,1235.

Potassium Sulphate 0·25 to 0·5% added to local Anæsthetics, useful—increases the effect. *cf. Note* to Potassium Sulphate.

Indications and Contra-indications for Spinal Anæsthesia.

Spinal analgesia should be restricted to certain exigencies. Cases for which local or venous anæsthesia are inadequate—operations involving danger o great shock, severe injuries associated with shock, urgent operations. For rectal surgery, prostatectomies, *abdominal operations especially*, but operations above the umbilicus, *e.g.*, thyroidectomy and extirpation of the larynx, are performed with it.—B.M.J. ii./10,766; Pr. 1911,227 *et seq.*

Tyrrell Gray found the method of value in diminishing shock, valuable in *renal disease*, disease of the *lungs*, and when *muscular relaxation* is desirable.—B.M.J. ii./10,766.

To examine urine and liquor cerebralis for Stovaine see Vol. II.

For the use of **Stovaine with Adrenalin** *v.* **Adrovaine.**

B P I **Stovaine Solution.** *For Internal Use. Dose.*—For persistent vomiting 5 to 10 minims every 2 hours without either food or drink. Later 3 to 5 minims before a meal :—

Stovaine 15 grains, Atropine Sulphate ½ grain, Morphine Hydrochloride 3 grains, Chloroform Water 1 ounce.

Compresses 5 to 10%. **Gargle** 0·5% (flavoured).

Glyco-Gelatin Pastils $\frac{1}{20}$ grain (0·003 Gm.). **Stovaine Snuff** for coryza 1 to 5% with Bismuth Carbonate and Milk Sugar is used.

Stovaine Ointment for painful wounds and hæmorrhoids :—
Stovaine 0·7, Adrenalin Solution 20, Paraffin Ointment 100.

Apothesine. *Syn.* GAMMA-DIETHYL-AMINO-PROPYL CINNAMATE. An anæsthetic with action as profound and more persistent than Cocaine. Less toxic than Cocaine.

Tablets 1¼ grain. One in 60 minims of water makes a 2% solution.

Tablets ⅗ grain with Adrenalin $\frac{1}{1600}$ grain. One in 30 minims of water makes a 2% solution with 1 in 50,000 of Adrenalin.

Dental Tablets ⅓ grain with $\frac{1}{2500}$ grain Adrenalin to dissolve in 18 minims of water.

Solution containing 1·5% Apothesine with 1 of Adrenalin in 60,000.

Effective, especially when combined with Adrenalin, but relatively inefficient when applied to mucous membranes. May also be used for spina anæsthesia. Solutions may be sterilised.—Jl.A.M.A., '20, p. 265, per Pres.

Only one-fifth as toxic as Cocaine and most nearly duplicates it for termina anæsthesia and nerve blocking.—Jl. Lab. & Clin. Med., Aug. '26,1082, pe Pres., Jan. '27,7.

✱Phenolaine (T.M. 452941).

Dose.—For general surgery, *e.g.*, for hernia or appendicitis use 2 drops of Phenolaine to each ounce of sterile water. Not more than 6 ounces of the dilution should be used at one time. For teet extraction use 8 drops to one ounce of water.

The preparation has been used in a large number of operation without trouble as regards bleeding or subsequent after effects It does not produce vasodilation on subcutaneous or intramuscula injection. Amputations of the breast have been conducted with 12 drops in 6 ounces of water.

Corneal opacities treated by subconjunctival injections of Phenolaine—see 'Ophthalmic Surgery' by V. Nesfield, reviewed.—L. ii./22,1128.

Gives prolonged anæsthesia in direct contact with nerve fibres.—A. J. Copeland, B.M.J. ii/24,41.

Nebulæ and leucoma of the cornea treated by subconjunctival injection of phenolaine 2 m. to ounce of tap water.—A. Ferguson, B.M.J. i./26,865.

"**✱Psicain**" (T.M. 449793), the acid tartrate of *d*-ψ cocaine, a syntheti Cocaine-isomer. A white powder, soluble in 4 of water, yielding a faintly acid solution. Said to be an improvement on cocaine.—C.D., July, '24,63

Both Psicaine and Cocaine give rise to symptoms identical in character though not in degree; Psicaine is the more powerful stimulant. Irritan effect less than Cocaine and insignificant for practical purposes. It has relatively little effect on blood vessels. It was found to be more toxic and less efficient than Cocaine.—A. J. Copeland, B.M.J. i./25,10.

✱Tutocaine (T.M. 437698). *Syn.* α-DIMETHYLAMINO-β-METHYL-γ-*p* AMINOBENZOYL OXYBUTANE HYDROCHLORIDE.

Used as local anæsthetic in 0·2 to 1% solution.

Tutocaine is about three times less toxic than Cocaine, and rather more than twice as toxic as Novocain. From clinical observations a 5% Tutocain solution has the same anæsthetic effect as a 3½% Cocaine solution.—E. Watson Williams, L. i./25,913.

For both infiltration and surface anæsthesia the minimal effective concentration of Tutocaine is ¼ that of Cocaine or Psicain (about 0·013% for Cocaine) The minimum lethal doses for guinea-pigs were Cocaine 0·05, Psicain 0· and Tutocaine 0·2 Gm. per kilo. The efficiencies, calculated as the rati of lethal dose to minimum effective dose, were 4, 6·3 and 64·5 respectively The anæsthesia is lengthened by the addition of Adrenalin to the solutions The addition of Phenol in small amounts increases potency in surfac anæsthesia.—W. Wagner, Arch. Exp. Path., Pharm., 1925,109,64-73; J.C.S A.i./25,1503.

The most suitable strength for urethral work is ¼ to ½% with Adrenalin—stronger solutions are unnecessary.—M.m.W., Oct. '26,1659, per Pres., Jan '27,7.

Butyn. Stated to be *para*-AMINO-BENZOYL-*gamma*-DI-*n*-BUTYL AMINO PROPANOL SULPHATE.

Dose.—By *hypodermic injection* 1 Cc. and upwards of ½ or mor per cent. solution according to circumstances.

Chemically it is allied to Cocaine and Novocain. A white amorphous powder, freely soluble in water.

A local anæsthetic quicker and more profound in action than Cocaine. When used in eye work, accommodation is not paralysed

For removing foreign bodies from the eye a drop of 1% solution almost immediately produces anæsthesia.

Butyn Sterules 1 and 2% 1 Cc. and TABLETS 1/6 grain (0·01 Gm.) are made. One of the latter in 1 Cc. of distilled water (*not* Normal Saline with which Butyn is *incompatible*) makes a 1% Solution.

Isotonic Solutions may be made with addition of Potassium Sulphate.

A ½% solution requires	1·34 Gm. in 100 Cc.	2% solution requires	0·97 Gm. in 100 Cc.
„ 1% „ „	1·21 „ „	5% „ „	0·24 Gm. in 100 Cc.

The absence of dilatation of the pupil justifies its use in glaucoma as an analgesic in combination with Eserine or Pilocarpine. Operations on the muscles by infiltration with 0·5% solution.—W. M. Beaumont, L. ii./22,304.

In operative eye work 1 to 2% Butyn solution used. For profound anæsthesia 4% or 5%. Four applications at intervals of 2 minutes. 2%, applied topically, also suited for nose, ear and throat, *e.g.*, septum resection, tonsillectomy and adenoids. In dental work 10 drops or more of ½% solution, on opposite sides of the tooth to be extracted, with or without Adrenalin; allow one minute to elapse. For genito-urinary work 2% used.—W. M. Beaumont, B.M.J. i./23,57.

Butyn is quite as toxic as Cocaine and less efficient.—L. ii./23,1297. *Cf.* our p. 342. Possibly 'habit forming.'—A. J. Copeland, B.M.J. ii/24,41.

Possible substitutes for Cocaine—discussion by Roy. Soc. Med. H. H. Dale spoke hopefully of the prospects of a suitable substitute being eventually found.—L. i./24,596. See also B.M.J. i./24,520.

Pharmacology of Local Anœsthetics (*Cocaine and Substitutes*), *see Vol. II.*

P1 CODEINA (*B.P.* '14). U.S., PH. NED. V., FR. CX.

$C_{17}H_{18}(CH_3)\,NO_3,H_2O=317{\cdot}192.$

Dose.—¼ to 2 grains (**0·016 to 0·12 Gm.**). (*B.P.* '14 ¼ to 1 grain), FR. CX. has *maximum single dose* ¾ grain, maximum during 24 hours 3 grains approximately. U.S. average ½ grain.

Codeine is not really dangerous as an addiction drug. It is wisely excluded from D.D.A.—Sir W. Willcox, P.J. i./24,28.

An alkaloid from opium or from morphine, in nearly colourless trimetric crystals. ***Soluble*** 1 in 130 of water (*B.P.* '14 is wrong), very soluble in diluted acids, in alcohol 90% 1 in 2, in chloroform and in excess of aqueous ammonia, but insoluble in excess of potash solution. It is a methylic ether of morphine—monomethyl-morphine.

Flavoring.—It has a slightly bitter taste, *vide* Morphine.

Uses.—In moderate doses is hypnotic and in frequent small doses it allays cough in phthisis. In diabetes beginning with a ¼ grain thrice daily it lessens the amount of sugar in the urine. A useful sedative in chronic cystitis with enlarged prostate.

For cough following catarrh ½ to 1 grain gives relief.—Tilley.

In tuberculosis relieves the night cough.—Dixon, Pr. XC., 1.

Diabetes insipidus under treatment with Codeine.—L. i./14,16.

Ⓟ**Codeine and Glycerin Jelly.** *Dose* —1 drachm=⅛ grain Codeine.

Codeine 72 grains, Citric Acid 720 grains, Refined Gelatin 6 ounces, Glycerin 36 ounces, Oil of Lemon 1 drachm, Balsam of Tolu and Distilled Water of each *q.s.* Make the Tolu water as ordered in B.P. for making syrup of tolu; of the liquor so prepared take 30 ounces; in 25 ounces of it soak the gelatin, heat till it is dissolved, and add the glycerin In the remaining 5 ounces of liquor dissolve the Codeine and citric acid, add the solution to the above, add also the oil of lemon, stir well together, and pour into bottles to 'set.' Useful in chronic laryngitis, phthisical cough, &c. Also in ulcer of the stomach.

Ⓟ**Pastillus Codeinæ.** ⅛ grain in each.

[P1]**Pilula Codeinæ Composita.**

Codeine ¼ grain (increased to 2 grains if necessary), Extract of Nux Vomica ½ grain, Extract of Lettuce ¼ grain or more. To make one pill, to be taken two or three times a day, for diabetes.

Note.—Use Mucilage, not syrup, as excipient.

Ⓟ**Capsulæ Codeinæ et Valerianæ Compositæ.** (The drugs are too deliquescent for a pill.)

Dose.—One or more *p.d.* according to strength, Codeine ⅓ to 1 grain, Valerian Extract 2 grains, Phenol 2 grains, Cascara Extract 1½ grains. In glycosuria, Codeine is the most valuable drug for treatment. The Valerian acts as nerve sedative, the phenol as disinfectant for the intestinal canal.

The combination has been found helpful.—G. Rankin.

Ⓟ**Trochisci Codeinæ** contain ⅛ grain (**0·008 Gm.**).

Ⓟ**Capsulæ Codeinæ cum Extracto Cannabis Indicæ.**

Codeine ½ grain, Extract of Indian Hemp ¼ grain.

In neuralgia one every 4 or 5 hours.

[P1]**Codeinæ Hydrobromidum.** $C_{18}H_{21}NO_3HBr+2H_2O=416·132$.

An anti-spasmodic similar in dose and use to the phosphate. For eye work has been advised to take the place of Ethyl-Morphine—being said to cause less pain.

[P1]**Codeinæ Hydrochloridum.** Ph. Ned. V.

$C_{18}H_{21}NO_3.HCl, 2H_2O=371·673$.

Dose.—¼ to 2 grains (**0·016 to 0·12 Gm.**). White crystalline powder, soluble 1 in 25.

[P1]**Codeinæ Periodidum.** $C_{17}H_{18}(CH_3)NO_3.2I=553·04$.

Dose.—¼ to ½ grain (**0·016 to 0·03 Gm.**).

When made by the interaction of Codeine base and Iodine in suitable solvent (*cf.* Alkaloidal Periodides), this compound is obtained as a yellowish-brown powder containing 54·1% Codeine.

The Periodide was made in the writer's laboratories (1923). A considerable proportion (38·5% of the Periodide) of the contained alkaloid is liberated to Physiological Acid and a further marked proportion (11·6% of the Periodide) is yielded to Physiological Alkali when treated with it subsequently.

Solubility.—Slightly soluble in Chloroform, soluble in Alcohol, insoluble in Ether and water.

Incompatible with alkalis, and with salts of metals, and otherwise as alkaloids.

Pharmacology.

Doses of ¼ and ½ grain were taken by two of the author's assistants (J.T.E. and C.C.B.). J.T.E. at the time was suffering from slight insomnia and a persistent cough. The effects of the ½ grain dose in relieving both the insomnia and the cough were so gratifying that he continued for a week on the treatment, taking ½ grain in capsule form each night.

Uses.—Suggested in moderate doses as hypnotic, in common with other Codeine compounds, also to allay irritating cough, especially of phthisis.

The antiseptic action of the Iodine it contains (45·9%) makes the compound a useful addition to therapy.

***Dispensing Note.*—To be given alone, finely powdered, in cachet or 'slipule' (No. 5) as required, preferably after a meal.**

$\boxed{P1}$**Codeinæ Phosphas** (*B.P.* '14). U.S. X., P. Jap., Fr. Cx., P.G. VI. $C_{18}H_{21}NO_3.H_3PO_4,2H_2O=433·219$.

Dose.—¼ to 1 grain (**0·016 to 0·06 Gm.**). Fr. Cx. has max. during 24 hours 5 grains approximately. Slipule No. 5 for ½ grain.

In granular snow-white crystals, soluble 1 in 4 of water. Contains 69·05% of anhydrous alkaloid (on salt$+2H_2O$), and is most suitable for hypodermic injection, 1 grain in 15 minims (**1 Cc.**).

Ⓟ**Syrupus Codeinæ Phosphatis** (*B.P.* '14).

Dose.—½ to 2 drachms (**2 to 8 Cc.**).

Codeine Phosphate 0·5% in a solvent of Distilled Water and Syrup. (Slightly over 8% stronger than B.P. '98.)

Ⓟ**Tablets, Compressed, of Codeine Phosphate** ¼ and ½ grain.

Ⓟ**Linctus Codeinæ, G.H.** *Dose.*—1 to 2 drachms.

Syrup of Codeine 1, Syrup of Virginian Prune, 1.

St. Th. H. has same strength of Codeine, but different vehicle.

Ⓟ**Syrupus Picis cum Codeina,** *v.* **Pix Liquida.**

$\boxed{P1}$**Codeinæ Sulphas,** U.S. $(C_{18}H_{21}NO_3)_2H_2SO_4, 5H_2O = 786·44$.

Average dose.—½ grain (**0·03 Gm.**).

Given with advantage in sciatica, also in *Morphine habit, q.v.*

$\boxed{P1}$**Codeine-Methyl-Bromide.** *Syn.* Eucodeine.

$C_{17}H_{18}CH_3NO_3.CH_3Br=394·215$.

Dose.—¾ grain (**0·05 Gm.**). Is less toxic than Codeine.

$\boxed{P1}$**Apocodeinæ Hydrochloridum.** $C_{18}H_{19}NO_2.HCl=317·625$.

Dose.—$\frac{1}{10}$, gradually increased to 1 grain (**0·006 to 0·06 Gm.**) A greyish powder soluble in water.

A good expectorant hypodermically Solution must be neutral; dose up to 25 minims of 2% solution. Internally, 10 to 30 minims of 1% solution caused no nausea or vomiting, but produced free expectoration. In pill 3 or 4 grains daily may be safely given.

Uses.—Is a sialogogue and sedative and increases peristalsis.

As *Hypodermic Purgative,* 30 minims of 1% solution = ⅓ grain 0·02Gm.), may purge in half an hour or less, but may also prove emetic.

COLCHICUM.

Syn. Meadow Saffron. Colchicum Autumnale. (*Liliaceæ*). Both **Corm** and **Seeds** are *B.P.* '14 and U.S. **F.I. requires the seed for the preparations of Colchicum. The Corm is in U.S. with not less than** 0·35% Colchicine. *Average dose.*—4 grains.

The seed U.S. **contains not less than** 0·45% Colchicine. *Dose.*—3 grains.

Ⓟ**Tinctura Colchici (Seminum)** (*B.P.* '14). Strength 1 in 10 Alcohol 70%, as required by F.I.=Fr. Cx. and Ph. Ned. V. B.P. '98 was 1 in 5 of alcohol 45%.

Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

Fr. Cx.—Max. Single Dose—25 minims, and max. during 24 hours 100 minims approx.—and P. Belg. have this strength.

Ⓟ**Vinum Colchici** (*B.P.* '14). 1 of Corm in 5 of Sherry.

Dose.—10 to 30 minims (**0·6 to 2 Cc.**).

Is given in mixtures with alkali and Magnesium Sulphate.

In gout controls the inflammation 30 minims as first dose, then 15 minims, every three hours. It is not objectionable to the taste.

Ⓟ**Liquor Antirheumaticus Compositus.**

Dose.—30 minims (**2 Cc.**).

Colchicum Wine 15, Spirit of Æther 5, Camphor 2, Compound Tincture of Lavender to 30. A preparation used on these lines in Denmark contains Ammoniacum in addition.

Ⓟ**Extractum Colchici** (*B.P.* '14). The inspissated juice of fresh Corms—as B.P. '98. *Dose.*—¼ to 1 grain (**0·016 to 0·06 Gm.**).

U.S. X. is an alcoholic extractive washed with Benzine, evaporated, assayed and adjusted with Starch to contain 1·4% Colchicine. Fr. Cx. extracts seeds with 70% alcohol, not standardised. Max. single dose ¾ grain, max. in 24 hours 3 grains approx.

Uses.—Removes the gouty swelling and congested state of joints by increasing the circulation, and so eliminating the obnoxious metabolic products of the disease. It may be given in pill with Ipecacuanha and Mercury.

To abolish the vomiting and diarrhœa often primarily produced (by increase of peristalsis) a small dose of Atropine may be given with it.

Ⓟ**Fluidextractum Colchici (Seminis), U.S. X.**

Dose.—3 minims. Standardised to 0·4% (**average**) Colchicine.

P1 Colchicina. Fr. Cx.

$$C_{15}H_9(O.CH_3)_3\left\{\begin{matrix}NH.CO.CH_3\\ CO.OCH_3\end{matrix}\right\} = 399{\cdot}208.$$

P.G. VI. has $C_{22}H_{25}O_6N+\frac{1}{2}CHCl_3$. (Contains 87% Colchicine.)

Dose.—$\frac{1}{100}$ to $\frac{1}{32}$ grain (**0·0006 to 0·002 Gm.**) in a pill.

Fr. Cx. has *maximum single dose* $\frac{1}{32}$ grain ; max. during 24 hours $\frac{1}{16}$ grain approximately.

Intravenously has been tried in dose of 1/100 grain with Sodium Iodide and Sodium Salicylate 1 Gm. each in 20 Cc.

This active principle is a yellowish crystalline powder, ***soluble*** in water (1 in 22 with neutral solution.—E. C. Davies and J. Grier, P.J. ii./22.210), readily in Alcohol 90% but less in Absolute Alcohol, very soluble in Chloroform, slightly soluble in Ether (1 in 155). It is a weak base, most of its salts being decomposed by water. Of use in acute gout, rheumatic gout, asthma, cerebral congestion, and uræmia.

Phosphotungstic Acid is useful for isolating the alkaloid.—Davies and Grier, *loc. cit.*

P1 Pilula Colchicinæ, Hyoscyami et Nucis Vomicæ.

Dose.—One every three or four hours.

Colchicine $\frac{1}{70}$ grain, Hyoscyamus Extract ½ grain, Nux Vomica Extract ¼ grain, Sugar of Milk ½ grain. Rapidly relieves gout.—A. P. Luff

Toxic Action. Colchicum affects the gastro-intestinal membrane. It may cause pains in the bowels, vomiting, diarrhœa, intense thirst, and violent burning in the throat, œsophagus and stomach.

Colchicine 34 mgr. taken over a period of 19 days with 6 to 8 drachms o

Laville's Liqueur caused paralysis. The palsy persisted for nearly a month. Even after 6 months not entirely cured.—B.M.J.E. i./15,19

Antidotes.

Evacuate the stomach. Give water and demulcents—white of egg, oil, barley water. Apply heat to feet. Stimulants.

P1 Colchicine Salicylate.—*Syn.* **Colchi-sal.**
$C_{22}H_{25}NO_6.C_6H_4OH.COOH=537\cdot256$.
Dose.—$\frac{1}{60}$ grain **(0·001 Gm.)**.

A yellowish powder, ***soluble*** in water.

To prepare this salt mix Colchicine 20, with Salicylic Acid 7, moisten with water so as to combine and evaporate carefully.

Ⓟ Capsules of Colchicine Salicylate.

Contain $\frac{1}{250}$ grain Colchicine dissolved in Methyl Salicylate. Used in rheumatism and gout. *Dose.*—One every two hours.

Gloriosa Superba (*q.v.*) contains Colchicine..

COLLODIUM.

Collodion (*B.P.* '14).—*Syn.* CONTRACTILE COLLODION.

A solution of Pyroxylin in an ether-alcohol mixture. Keep from naked light. Pure ether answers better. In preparing, solution is more rapid by adding the pyroxylin to the alcohol and afterwards the ether.

Collodion (*B.P.* '14) is far too thin: increase the Pyroxylin by 50 to 100%, the latter in preference.—J. H. Franklin, P.J. i./27,52. We agree.

Acetone is also a good inexpensive solvent, but the disadvantage is that the film is opaque. **U.S. X.** has Pyroxylin 4, Ether 75, Alcohol 25.

FR. CX.—Pyroxylin 5, 95% Alcohol 20, Ether (0·724 at 15°) 75.

P.G. VI. gives directions for proceeding direct from Cotton Wool.

Pyroxylin (dinitrocellulose $C_6H_8(NO_2)_2O_5=252\cdot08$) is prepared by the action of nitric and sulphuric acids on cotton. It is freely soluble in Methyl Alcohol, Acetone, Amyl Acetate, Glacial Acetic Acid, and Ether mixed with an equal volume of either Ethyl or Methyl Alcohol. In making **gun-cotton** (trinitro-cellulose) $C_6H_7(NO_2)_3O_5=297\cdot08$ the mixture of acids contains a larger proportion of nitric acid and the time of action is longer. This body is insoluble in a mixture of Alcohol and Ether.

Pyroxylinum, U.S. X. gives double the molecular formula—
$C_{12}H_{16}(ONO_2)_4O_6=504\cdot16$.

Some comparative experiments which we conducted with a view to improving on '**Collodion**' gave the following:—

Collodium Aceto-Æthericum.—Pyroxylin 5, Acetic Ether *q.s.* to 100. The odour is a slight objection, otherwise the best substitute so far found. Does not pucker the skin anything like so much as the B.P. preparation. Is simple in making. Consistence excellent

Is not more irritating in use than Collodion (*B.P.* '14). Adheres closely and is transparent.

Collodium Acetonum B.P.C.—Pyroxylin 5, Clove Oil 2, Amyl Acetate 25, Benzol 20, Acetone to 100. U.C.H. adopts this. Another formula: Pyroxylin 5, Camphor 1, dissolve in Acetone 90, and make up to 100. Evaporates more slowly than ordinary collodion, but makes stronger film.

P1 **Anodyne Colloid.**—*Syn.* AMYL COLLOID.

Amyl Hydride ½ ounce, Absolute Alcohol ½ ounce, Aconitine 1 grain, Veratrine 6 grains, Collodion to 2 ounces.

For neuralgia, sciatica, lumbago, all muscular pains, &c. The amyl by its rapid volatilization often produces almost instantaneously the desired result; but should the pain continue the alkaloids can be brought into activity by applying a piece of moist spongio-piline over the collodion film.

'**New Skin**' is a Collodion preparation.

Collodium cum Oleo Crotonis.

Croton oil 1 part mixed with 7 parts, more or less as required, of Flexible Collodion, forms a useful counter-irritant; a thin layer painted on quickly dries and its action is limited to the spot to which it is applied.

Collodium Flexile (*B.P.* '14).

Contractile Collodion with addition of a small proportion of Canada Turpentine and Castor Oil, makes a more elastic film than Contractile Collodion U.S., which contains 2% Camphor and Castor Oil 3% in Collodion U.S.

Pyroxylin dissolved in acetic ether adheres closely and is pliable. See our experiments under Collodion.

Collodium Elasticum, P. Austr., Ph. Ned. V. Collodion 98, Castor Oil 2. FR. CX. has Collodion (FR. CX. *q.v.*) 95, Castor Oil 5.

Collodium Benzoini.—*Syn.* KELLY'S PAINT.

Add Compound Tincture of Benzoin 3 to Collodion 1, shake until mixed and add Glycerin 1. Keep well corked and shake before use.

As an antiseptic covering to slight wounds. It dries slower than ordinary collodion, but gives a harder film. Used in New York.

Collodium Iodi. Iodine 1 (more or less if required) to 15 Flexible Collodion, sustains the action of the iodine and the film protects the part. Recommended for ringworm, alopecia, chilblains and frostbite.

Collodium Salicylicum.

Salicylic Acid 1, Flexible Collodion (¾ strength) 5. For use on exposed parts like the next preparation.

In skin diseases, Salicylic Acid 1 drachm in 8 said to have amazing results in chilblains, and to be useful in many dry dermatoses. Remarkable results in acute dermatitis, eczema, etc., with ointment of equal parts of Salicylic Acid and Vaseline.—Sir G. A. Reid, Clin. Jl. Dec. 26/23,617.

Ⓟ**Collodium Callosum.**

Salicylic Acid 8, Extract of Indian Hemp 1, Flexible Collodion (¾ strength) 60. A rapid and painless solvent for corns and warts. Ⓟ**Collodium Acidi Salicylici**, L.H. is similar, namely Salicylic Acid drachm, Extract of Indian Hemp 20 grains, Flexible Collodion 1 ounce. ⓅSt. Bart.'s H. adds Zinc Chloride 20 grains to the ounce.

Ⓟ**Collodium Salicylicum cum Zinci Chlorido.**

Salicylic Acid 2, Zinc Chloride 1, Collodion 15. Forms a clear solution. This and the above have proved useful in epithelioma

Ⓟ**Mercuric Chloride** to the extent of 1 in 30 or more of Salicylic Collodion may be used to warts.

Collodium Salicylicum et Lacticum.

Salicylic and Lactic Acids, of each 10, Collodion 80. Lactic Acid being destructive to morbid growths, is said to increase its efficacy

Collodium Stypticum.—*Syn.* **Styptic Colloid.**

Absolute Alcohol 16, Benzoin 1½. Dissolve, filter, and add Tannic Acid 16, Gun Cotton 1½, Purified Ether to 100. Mix, set aside three days, and decant. Useful in checking various forms of hæmorrhage when it can be brought in contact with the bleeding surface.

Camphoid, a substitute for Collodion.

A solution, 1 in 40, of pyroxylin, in a 33% solution of camphor in absolute alcohol made by weight. May be used as a vehicle for the application to the skin of such drugs as iodoform, phenol, salicylic acid, resorcin, iodine, chrysarobin, and ichthyol. Iodoform dissolves in it to the extent of 1 in 10. The preparation dries in a few minutes, leaving a film, which is not easily washed off.

Celluloid. Made by dissolving Pyroxylin 50 in a solution of Camphor 25 in ether 100 and manipulating the mass until it has become plastic. It is then dried. Colours may be incorporated.

It is supplied in thin sheets and being light, rigid and washable, is useful in surgery for splinting; it is rendered plastic by rolling up and macerating in hot spirit for a few minutes; it may then be wrapped round the limb with a layer of wool outside and quickly sets. N.B.—Very inflammable. Celluloid was originally called **Xylonite.**

Soluble according to our work more readily in Acetone than in Amyl Acetate, but the film resulting in the first case is liable to be opaque. Mixtures of these solvents are frequently used. A collodion can be readily made strength 1 in 20 using equal parts of the solvents. (The celluloid should be shredded).

Celluloid Splints made by coating a layer of stockinette, previously spread over the 'model,' with a 10% Solution of Celluloid in a solvent such as Acetone several times. The model is made by pouring a semi-liquid mixture of Plaster of Paris and water into the well oiled cast and leaving it to set. Pieces of gauze appropriate to the model are also used and incorporated with the Celluloidal layers. After setting cut down with a sharp knife.—J. Wicliffe Peck, P.J i./13,5.

Acute poliomyelitis treated with Celluloid Splints.—L. ii./14,216.

Perforated Celluloid 0·15 mm. thick rendered softer by soaking in 5% Carbolic Lotion, placed next to a wound where there has been much loss of skin, with the usual dressing above; relieves the pain of redressing. Thicker suitable for making splints.—S. R. Douglas, L. ii./16,558.

Celluloid Plates in Plastic Surgery placed beneath deep cicatrices without causing irritation, also celluloid solution in acetone successful, also a secret preparation. The solutions found preferable.—C. Higgens, L. i./16,643.

Celluloid 5% in Acetone excellent adhesive for use in applying traction.—B.M.J. ii./18,376.

Pexuloid.—A special solution to produce light strong non-inflammable celluloid splints. The method is similar to the above, the whole being finished with a special splint varnish. As used at the Hospital for Sick Children, Great Ormond Street, London.

COLLOIDAL METALS.

Certain Metals and Metalloids in the form of Colloidal Solutions are considerably used in therapeutics.

A. General Characters.

Thomas Graham devised the term **Colloidal** (from Κολλα = glue) to distinguish between the amorphous substances in solution, which diffuse with difficulty, and the **Crystalloid** substances, *i.e.*, those crystallising easily from Solutions and which diffuse quickly from their solutions into a water stratum, or which pass with ease through membranes, *e.g.*, those employed in the process known as dialysis. Glue and Gelatin are typical examples of Colloidal substances,—they do not exhibit the property of diffusion in this manner.

The view held now is that colloids and crystalloids are not different kinds but rather different states of matter, the same chemical substance being obtainable in one state or the other according to how it is made. Many substances which might be regarded as typical crystalloids have been produced in the colloidal condition. For theoretical study see 'Chemistry of Colloids and some Technical Applications,' by W. W. Taylor (E. Arnold).

The real characteristic of the colloidal state is that the particles are large enough to possess the properties of surface.

The distinguishing feature between Crystalloids and Colloids, viz., diffusibility or non-diffusibility, through a membrane, is not characteristic of a substance in all its solutions, for example, in water Sodium Chloride is in true solution, whilst in dry Benzole it is in a colloid state.—P.J. i./14,109.

Other liquids, *e.g.*, Alcohol, Glycerin and even Sulphuric Acid, in addition to water, have the property of producing Colloidal Solutions. Broadly speaking, these solutions are merely suspensions of minute particles of the colloidal substance uniformly distributed, so that the suspension appears homogeneous to the naked eye. Homogeneity is, however, not seen by the microscope and the solutions are therefore called micro-heterogeneous.

The two constituents of a colloidal solution are called 'phases.' The phase consisting of isolated particles is known as the '*disperse*,' or '*internal phase*,' whereas the medium in which they are suspended is termed the '*continuous*' or '*external phase*.' In some instances the '*disperse phase*' may be of the nature of a fibrous frame, *e.g.*, like a sponge or mesh-work, through which the *continuous* medium permeates.

Suspensoid is the name given to that class of colloid, the particles of which consist of pure solid. Those in which the disperse phase contains water belong to the emulsoids.

Inbibition is the term applied to the taking up of water by a colloidal system, such as an emulsoid. Heat is liberated in the process and the water is compressed.

Colloids dispersed in solution usually show a contraction in volume corresponding to quantity, in other words the density cannot be obtained by calculation.

The *Osmotic pressure* of most colloidal solutions is very small, exceptions being those colloids which are salts of an inorganic base or acid such as Na or Cl respectively, combined with a large organic ion as the anion or cation. Examples: Soaps and dyes like night-blue.—Bayliss.

The particles of the 'disperse phase' show '*Brownian*' *Movement*. Those the diameter of which exceed 3 to 5 μ do not show it.

'Brownian' movement is due to the perpetual movement of the molecules of the liquid, and to their possession of mass and, therefore, kinetic energy. The colloidal particles are continually being hit by these molecules and their movement is thus maintained.

The reticular structure, described as present in living protoplasm, is undoubtedly due to inadequate methods of illumination. Living cells appear to contain colloidal solution with the particles in 'Brownian' movement.

The *optical property* of a Colloidal Solution is usually that of dichroism, *i.e.*, transparency by transmitted light and relative opacity by reflected light.

Electrical Properties.—The disperse particles are charged with + or — electricity.

In water, amongst the + charged are the Metallic Hydroxides, Silicic Acid and Basic Dyes, *e.g.*, Methyl Violet, Methylene Blue and Magdala Red in Water. Amongst the — charged are all the Metals, Metallic Sulphides, and certain Dyes such as Indigo, Eosin, Fuchsin, also Mastich, Gamboge and Starch.

On passing an electric current into a colloidal solution the + charged particles move towards the cathode and the — towards the anode.

The neutralisation of charges in these solutions is distinct from changes of solubility due to the formation of chemical compounds with the ions of the salts added, as is evidenced by the trivalent Lanthanum salts, which are effective in small concentration.—Bayliss.

Some colloidal solutions show the property of coagulation or precipitation when submitted to heat, or by mechanical means—or they may be transformed into jellies—the insoluble body being called a 'gel' (Graham designated colloidal substances in liquid form 'Sols' and in jelly form 'Gels.')

A 'gel' may mean the coagulated or precipitated form of any colloid, suspensoid or emulsoid, or it may refer to the state of a solution of Gelatin when cold. The precise structure of a "solid solution" of Gelatin does not appear to be clear.

On coagulation the substances may be either 'reversible' *e.g.*, aqueous solutions of Gelatin, Glue, Gum, or 'irreversible' to the original form, *e.g.*, Ferric Oxide, Alumina, Gold, Silver, Platinum. The inorganic colloids are mostly irreversible and are precipitated by very small amounts of some salts, while large amounts of other salts have no effect. The reversible includes mainly the organic colloids—these are not so sensitive to coagulation by electrolytes.

The precipitation of colloids, due to electrolytes, varies with each electrolyte used, depending on the concentration of the uni-, bi- or tri-valent ions.

The concentration of a particular ion required to deprive colloidal particles of their electric charge is called the *isoelectric point*. The H ion is frequently intended but should be so stated. The *isoelectric point* of hæmoglobin is said to be $10^{\cdot 6 \cdot 8}$.—Bayliss.

Protection.—All metallic colloidal solutions require *protection* by some organic colloid such as Gelatine, Albumin, etc. *Unprotected electrically prepared colloids are so unstable that they would probably have to be freshly prepared for use every day.*

The presence of protectives, unless controlled, and information given of the protective present, renders reports of therapeutic action of no value, as, for, instance, when Peptone or Silicic Acid is used. Their action in preventing the precipitation of suspensoid colloids is probably due to the deposition of a layer of emulsoid on the surface of the particles. The majority of metallic colloids may remain stable for some time in the absence of a protective.

The addition of Sodium Chloride, to render a solution for medicinal use isotonic with blood, according to Bayliss, is unnecessary, as the amount injected is small, and should be given at a slow rate.

R. Zsigmondy expresses the protective effect of different substances by the 'gold value,' *i.e.*, the number of milligrammes of a colloid which are just capable of protecting 10 Cc. of a Gold Solution containing 0·0053 to 0·0058% of Gold from coagulation by 1 Cc. of a Sodium Chloride Solution containing 100 Gm. of Salt in 900 Cc. of Water.

Gelatin and Glue	have a gold value 0·005 to 0·01.
Egg Albumen and Gum Arabic	,, ,, ,, 0·1 to 0·25.
Dextrin	,, ,, ,, 6 to 20.
Potato Starch	,, ,, ,, about 25.

NOTE.—The reader should not misunderstand these figures; the Gelatin has the greatest protective power and Starch the least.

Regarding the size of the particles in colloidal solutions, V. Pöschl classifies their magnitude as from 20 $\mu\mu$. to 0·1 $\mu\mu$. Above the former one may speak of mechanical suspensions. The latter figure is approximately the extreme limit of divisibility. It is, according to this authority, the upper limit to the absolute size of molecules.

Particles in Colloidal Gold solutions vary from 6—15 $\mu\mu$.

Relationship of colour of Colloidal Solutions and size of the particles (Gold, Silver, Platinum, Mercury, Copper, etc.).—W. Ostwald, J.C.S.A. ii./11,868; *see also* ii./12,240.

Colloidal metals were called by the somewhat imaginary names '**metallic ferments**' or '**artificial enzymes**,' since they have in some instances a catalytic property which resembles enzyme action, hence the analogy.—B.M.J. i./12,252, *et seq.*

For particulars of adsorption see Vol. II.

B.—Verification of the Colloidal Condition.

With regard to the *examination* of a colloid solution there are varying identifying characters (1). Naked eye examination (already mentioned)—dichroism; further there is fluorescence (especially characteristic of many Hydrosols). (2). Appearance on examination with the ultramicroscope. (3). Indiffusibility. (4). Stability at higher temperatures. (5). Instability in presence of certain electrolytes—alteration by these is a permanent characteristic of Sols. If stable, protective Colloid is probably present.

In the ultramicroscopic method (*a*) care must be taken to examine the solution in a state of dilution comparable with that of a solution known to have all the particular compound present in the colloidal state. Certain commercial preparations, though showing particles with the ultramicroscope, have been found to contain nearly all the matter present in true solution, and diffusible through parchment.

(*b*) Extent of true solubility of the substance in the liquid must be taken into account. Thus, Iodine is soluble in water 1 in 5,000, and in a colloidal preparation it would therefore be suspended in a saturated solution. The so-called 'solutions' of Iodine in Oil would, of course, contain a larger amount n true solution. In fact, in many commercial preparations it has been found that the activity is equivalent to the fraction present in true solution.—Bayliss.

Fractional Diffusion as a means of ascertaining uniformity of fine suspension or homogeneity of colloidal solutions. Diffusiometer for.—J.C.S.A. ii./12,1146.

Tests of Colloidal Sols.—Examination of Colloidal Sols with the ultramicroscope or with 1/12th inch oil immersion and an 8 c. Leitz eye piece, using a specially good dark ground illumination, showed marked difference in amount of movement of various preparations.

Colloidal Sols must also show the "**Tyndall Effect**"—*i.e.*, when placed in a test cell made of optical glass and subjected to action of a powerful beam of parallel light they show the characteristic turbidity.—A. B. Searle, Pres., June. 1920, p. 235.

For a further consideration of the subject from the theoretic aspect, R. Zsigmondy's 'Colloids and the Ultramicroscope'—English translation by J. Alexander—(Chapman & Hall)—should be consulted. The nomenclature of the subject, which we have briefly given, is the same as employed in the last mentioned work. The book deals largely with the size of the particles in colloidal solutions, *e.g.*, of Gold, Platinum, Palladium, etc., and their motion in the medium.

C.—Methods of manufacture previously published.

1.—CHEMICAL METHODS.

Aluminium Hydroxide Hydrosol was first made by W. Crum with a freshly prepared Neutral Aluminium Acetate as starting point.

See The Chemistry of Colloids, by Victor Pöschl, English Translation by H. H. Hodgson, C. Griffin & Co.—a useful compendium of the early work.

Aluminium Hydroxide Colloid intravenously produces death in animals but Calcium Chloride added prevents it—J.E.R.McDonagh, B.M.J. i/17, 565.

Arsenic.—A solution of Arsenic Chloride in Absolute Alcohol at −15° C. added to a Solution of Hypophosphorous Acid in the same solvent at −15° C. gives a brown precipitate which contains 68·2% Arsenic and 0·97% Phosphorus and gives a colloidal solution in dilute alkali solutions.

Bismuth.—Bismuth Hydrosol is obtained by reducing dilute Ammoniacal Solutions of Bismuth with Stannous Chloride.

Prepared by reducing with 5 parts of 1% Sodium Hydrosulphite a mixture of 1 part of a 10% solution of Bismuth Nitrate in 88–90% Glycerol, with 36 parts of 0·45% aqueous Gum Arabic, the whole being quickly diluted with 60 parts of water. The resulting colloidal solution is filtered. On careful evaporation a black metallic residue which contains about 18% of Bismuth and 1% of Colloidal Sulphur is obtained, which dissolves completely in water to reform the colloidal solution.—J.C.S., Aii./25,860.

Copper.—The method given by V. Pöschl produces a reddish brown Hydrosol with water, but it is unstable.

Gold.—R. Zsigmondy gave details for reduction of Gold Chloride Solution with Potassium Carbonate or Bicarbonate.

Ferric Hydroxide Hydrosol was made by prolonged boiling of a solution of Ferric Acetate. Acetic Acid is driven off—it is a process of hydrolysis. For details *vide* Pöschl.

Manganese Hydrate Hydrosol was made by reducing Potassium Permanganate and washing the precipitate with water. After several decantations a dark brown Hydrosol forms.

Mercury.—Stannous Chloride or Stannous Nitrate has been used for reducing Mercurous Nitrate (dilute solution).

Platinum Group of Metals.—A **Hydrosol of Platinum** may be made by a method similar to that used by Zsigmondy for the preparation of Gold Hydrosol. By previous dilution and subsequent dialysis a stable Hydrosol is obtained. **Hydrosols of Palladium, Rhodium** and **Iridium** were made likewise—the two latter are, however, unstable.

Selenium.—Selenium Hydrosol is obtained by reducing Selenic Acid (SeO_3) with a 7 to 8% Solution of Sulphur Dioxide and cooling. Add excess of Ammonia and then neutralise the excess with Oxalic Acid. Centrifugalise the liquid—this separates the Colloidal Selenium from the medium. Finally dissolve in water.

The Solution is coagulated by Potassium Chloride, Potassium Sulphate and Sodium Carbonate, not by Acetic, Tartaric or Oxalic Acids or Ammonia.

Silicic Acid (Soluble).—A typical example of the early work in Colloidal Chemistry.—*Vide* V. Pöschl.

Silver.—The most concentrated Hydrosol is said to be 4·75 Gm. of Silver per litre. It rapidly deposits a black precipitate. We give a modified Carey Lea method yielding good results.

Hydrazine Hydrate (1 in 2,000), Hydroxylamine Hydrochloride, and Hypophosphorous Acid have also been used for Silver.

Pyrogallol method.

Silver Nitrate 3·58 Gm. in dry Pyridine 50 Cc. is treated with 25 Cc of a solution of Pyrogallol containing 0·57 Gm. in the same solvent. The slightly yellow solution formed on diluting with water yields a Colloidal Silver Solution. Solutions containing 0·05 Gm. of Silver per 100 Cc. of liquid are fairly stable, and by centrifugalisation the greater part of the Colloid can be separated from them. Using Tannic Acid instead of Pyrogallol, the result is similar. Solutions of Copper Sulphate act similarly.—A. Pieroni (Gazzetta, 1913, 43, i. 197—200), ex J.C.S.A ii/13.393

Sulphur.—This is made by pouring a concentrated solution of Sodium Thiosulphate drop by drop into cold Concentrated Sulphuric Acid (Sp. Gr.=1·84). The Sulphur Hydrosol throws out Amorphous Sulphur in a few hours—this changes in time to Crystalline Sulphur.

Trillet's Method was to precipitate solutions of Metallic Salts with an alkali in presence of *Albumen*—forming types of colloidal solutions of the metals—called Oxydases of the metals. The alkali must be removed.

2.—ELECTRICAL METHODS.

The disruption by an electric arc of metals into fine powder and the formation of dark liquids by employing terminals of the metal required has been in particular investigated by G. Bredig (1898). A direct current arc is used. The strength of current is 5 to 10 ampères. E.M.F. between 30 and 110 volts. Gold, Platinum, Palladium, Iridium and Silver Sols were made on these lines. The cathode is the chief participant in the disruption.

Mollinari's Chemistry, Vol. I., 1912, p. 103–105, gives the following brief details of **Bredig's Process** for making a Hydrosol of Gold.

A current of 8 to 10 ampères at 100 volts passes through two gold wires 2 centimetres beneath the surface of 100 Cc. of Water (purest distilled), containing a trace of Sodium Hydrate, so as to produce an electric arc. The ends of the wires are 1 to 2 mm. apart.

Theo. Svedberg and others have improved upon Bredig's process. Of the non-metals, Carbon, Silicon, Selenium and Tellurium were made in colloidal condition by the method.

Stable colloidal solutions may be made by electrolysing 5% Gelatin Solution containing 1% Sodium Chloride or Sodium Sulphate (to render slightly conductive) between metallic electrodes. The anode is in a glass vessel containing the solution whilst the cathode composed of the metal to be made colloidal is enclosed in an inner porous cell. Use continuous current, 3 to 5 ampères at 120 volts. Colloidal solution forms in 10 minutes in neighbourhood of the anode. The liquid surrounding the cathode is free from metal. Gold Sol in this way containing 42 mgr. of Gold per litre was made. Silver 87 mgr. per litre, in one case 3·2 Gm. in 448 Cc. The Gelatin is decomposed partly, forming Protalbinic and Lysalbinic Acids.—C. Serono, J.C.S.A. ii./10,776.

Pure elemental **Arsenic** is best made by electrolysing an alkaline solution using Arsenic as anode, or better by electrolytic reduction of a solution of Arsenious Oxide 3 Gm. in a litre of 0·3% Sodium Hydroxide using a current of 2 to 3 amp. and 100 volts, a Platinum Cathode and Mercury Anode. Cool the solution during electrolysis and purify by dialysis. The addition of a trace of gum is useful for keeping. A solution made this way contained 0·07% Arsenic.—Lecoq (Compt. rend., 1910,150,700), J.C.S.A., 1910, ii./406.

High-frequency alternating currents passing between electrodes of the metal immersed in water have been used in a new method of preparing aqueous colloidal solutions of metals. Varying the range of frequency of the current between wide limits, it was found that the *colour* supposed to be *characteristic of the colloidal solutions of metals is a result of the special conditions of the discharge.*

Thus gold, on altering the frequency, can be made to give a red, blue or purple solution; in the red solution the particles are negatively charged and in the blue solution positively charged. The purple solutions contain both kinds of particles. The red solution is converted into the blue by the action of an electrolyte or electric field.—H. Morris-Airey and J. H. Long, Na., Jan. 1/14. See also J.C.S.A. ii./13, 1033.

For a complete study of all the methods of making colloidal solutions of inorganic substances, The Svedburg—"Die Methoden zur Darstellung Kolloider Lösungen Anorganischer Stoffe"—should be consulted.

D. Manufacture of Colloids, Patents for—

(1) Chemical—

British Patent No. 21,521/11 (H. Crookes). Solutions of Peptone, Gelatin, Dextrin, or Meat Extract are used as vehicles for the preparation of Colloids. They are sterilised by boiling and contain varying proportions of Sodium Chloride. Solutions of Salts are then added, *e.g.*, Silver Chloride or Bromide, Mercury Bicyanide or Perchloride, Arsenious Acid and Salts of Thorium and Cobalt are mentioned as having strong germicidal action; and salts of Bismuth, Lead, Nickel, Iron and Aluminium as being weak germicides. The following is given as an example for the preparation of Colloidal Silver:—

Peptone 300 grains and Salt 800 grains are dissolved in 40 ounces of water. Silver Nitrate 27·59 grains are dissolved in another 40 ounces of water, and added to the Peptone Solution. The whole is heated in a hot air oven for 48 hours at 100° C., and then filtered from the precipitate.

British Patent No. 28,776/1912 (H. Crookes). To a solution of Peptone or like body, with or without the addition of Salt, a 0·1% solution of the desired metal is added, then 0·01 to 0·1% of Phenol, and the whole boiled, *e.g.*, Silver Nitrate 27·59 grains, Water 40 ounces. Dissolve and add to a solution of Peptone 300 grains in 40 ounces of water, then add the Phenol and boil. Only 150 grains of Peptone are necessary in the preparation of Colloidal Iron.

Another example mentions Copper Nitrate with Peptone and Arsenate of Soda or dilute Potassium Iodide Solution instead of the Arsenic for the preparation of Colloidal Copper. The Peptone is said to be sufficient to reduce the metals without the use of Sodium Chloride. The Phenol prevents the Colloids from breaking down.

German Patent.—Chem. Fab. Von Heyden, D.R.P. 202,561.

Reduction of an alkaline solution (NaOH) of Arsenic in presence of egg albumen, gelatin, etc., by alkaline Pyrogallol. The solution is dialysed or precipitated by acid, washed and again dissolved in water. May also be precipitated by Acetone, Alcohol or a mixture of the latter with Ether.—J.C.S.A., 1909, ii./310.

British Patent No. 1219/1912 (A. Dering). **Preparation of Colloidal Mercury** by heating Mercuric Chloride in oils such as poppy, linseed, and the like, containing Triglycerides. 5 parts of Mercuric Chloride heated with 100 parts Poppy Oil 20 minutes on open flame. The oil then dissolved in Ether washed with water, dried and freed from Ether. The oil thus produced may be used for medicinal purposes, *e.g.*, treatment of syphilis.

Colloidal Sulphur No. 7238/1913. Patented process by introducing Sulphur Dioxide and H_2S into dilute HCl. The bodies interact, forming Sulphur and Water; the former remains colloidal.—P.J. ii./13,216.

(2) Electrical—

British Patents Nos. 14,369/1912 and 24,666/1912 relate to the separation of one Colloid (*e.g.*, a metal) from another, to which it is adsorded by electrosmosis. Taking advantage of the difference in sign or potential of the charge in each, a diaphragm having the same sign or being indifferent to the pole may be used, so that only the desired Colloid passes through. Also the pole may be isolated with another diaphragm in order to prevent decomposition of the ions of the desired body.

British Patent No. 29,049/1912 (Gesellschaft für Elektrosmose) describes the preparation of colloids as follows:—To a colloidal solution of Albumin, Aluminium Hydrate, Carborundum, or Silica, one adds a solution of the desired metal and reduces it by means of Formaldehyde. It is then separated by electrosmosis.

Colloidal preparations of Commerce examined and analysed and several found far below the strength stated, and the Iodine in one is not in colloidal form at all.—A. J. Clark, B.M.J. i./23,273.

E. The Colloidal Metals of Commerce and their Therapy, together with our Experience in their Manufacture.

The keeping properties of simple Hydrosols are poor. Therapeutic agents of so tedious a nature to prepare as are some of these Colloids, which will not remain in their primary condition more than a few weeks, are unsatisfactory. The requisite presence of a protective renders some of the Solutions indefinite. They may contain *compounds of the metals with protein decomposition products, i.e.*, Metals combined as organic salts. In the stable colloidal solutions Gelatin or some other form of protective is a *sine qua non*.

Therapy.—Physiological trials which we had conducted showed that the Hydrosols in general were well tolerated. When injected, it is conceivable that the minute particles of a colloid metal may be reactive. Though relatively non-toxic, clearly reasonable precautions should be taken to avoid excess in treatment.

It has been suggested that as the effect is based on leucocytosis which these bodies produce—the bactericidal power *in vitro* being slight—the actual *kind* of metal used is of less importance.

Infective conditions, *e.g.*, pneumonia, pleurisy, peritonitis, influenza, typhoid, tuberculosis and other febrile conditions, have been treated by subcutaneous, intramuscular and intravenous injections. They have also been used locally in cystitis, gonorrhœa and epididymitis.

Copper and Selenium have been tried in malignant disease.

The late Sir W. M. Bayliss held that when a drug is prepared in the colloidal state it does not necessarily acquire any special therapeutic qualities.—B.M.J. i./23,193.

The fact that colloids are in the same physical state as some of the body constituents is of no significance. Many substances in the body, e.g., Sugar, Calcium and, above all, Oxygen, are not in colloidal form. No good evidence has been produced that the chemical or pharmacological action of colloids differs from that of bodies in true solution, otherwise than in the matter of gradual slow effect.—Sir W. M. Bayliss, L. i./22,38.

(1) CHEMICALLY PRODUCED.

Aluminium Hydroxide (✱COLLOBELL.—T.M. 429532) 1%. A mildly astringent preparation for use as a gargle and mouth wash. Not for use hypodermically.

Antimony.

Antimony Sulphide Colloidal made according to the following directions has been used. *Dose.*—Intravenously up to 20 Cc.

A solution of Tartar Emetic 0·5% is saturated with Hydrogen Sulphide. The Acid Potassium Tartrate formed is removed by dialysis. The red liquid is tested by titrating with decinormal Iodine in presence of Sodium Bicarbonate and the strength adjusted to 1 : 500. Glucose 5% is added to isotonise, Gum Arabic 0·5% to render stable, and Phenol 0·5% to preserve. In kala-azar with some success.—L. Rogers, L. i./19,505.

Antimony Sulphide (✱COLLOBELL) 0·04%. *Dose.*—2 to 10 Cc. intramuscularly twice weekly. In protozoal affections.

✱ **Oscol Stibium** (T.M. 305256). *Dose.*—1 to 4 Cc. intramuscularly found to have beneficial effect in leprosy.—F. G. Cawston, B.M.J. ii./20,76,855. See also Jl. Trop. Med., Nov. 1/22,345.

1000 injections given. Dose used 2·5, 3 and 6 Cc. on consecutive days. Three weeks later 4·5 and 6 Cc. on consecutive days. The series was repeated during two months, making a total of 40 Cc. Relief of paralysis. Results encouraging.—G. H. Wildish, B.M.J. i./22,55.

LEISHMANIA INFANTUM.—Treated by colloidal Antimony Sulphide, 0·001 Gm. per Cc. *Dose*, 3 Cc. intramuscularly (buttocks), daily, on alternate weeks. In a fortnight, spleen had decreased in size, and in 4 weeks regained normal position, but patient died from hæmorrhage (epistaxis).—R. Samut, L. i./22,995.

PULMONARY TUBERCULOSIS.—0·5 Cc. intramuscularly into the flexor muscles of the arm twice weekly, of value; the treatment can be carried out in the out-patient clinic without fear of untoward reactions. No ill-effects from some thousands of injections. Suggested that injections should be continued until physical signs have cleared up.—P. Moxey, B.M.J., i./27,374.

Arsenic.

We obtained a colloidal solution by reducing a 1% Arsenious Acid with Hypophosphorous Acid in the presence of a protective of Gelatin (1/4%). The solution can be dialysed and diluted for use to the strength 1 in 2,000. 1 Cc. would contain ½ mgr. This hydrosol *of Arsenium,* however, is not permanent.

Pure Colloidal Arsenic is much *less toxic* than Arsenious Oxide to animals.—Lecoq. J.C.S.A. 1910, ii./434.

Arsenic Sulphide (✱COLLOBELL) 0·1%. *Dose.*—15 to 60 minims in water twice daily after meals. By injection, 1 Cc. twice weekly for a month. In blackwater fever, influenza, etc.

Bismuth Hydroxide (✱COLLOBELL) 0·05%. *Dose.*—1 drachm 3 times a day between meals. In gastric affections.

Calcium. (The Calcium is in *a state of combination, not present as such*). *Dose.*—0·5 Cc. to 1 Cc. *hypodermically* under the skin of the back of the forearm every 5 or 7 days. Strength 1 in 2000. Protective used is Glutaminic Acid obtained from Gelatin.

Tuberculosis has been treated with improvement in temperature, hæmoptysis and night-sweats.

In addition to the injections (0·5 Cc. or less for children) to be given first, then wait a week to see if there is reaction, Calcium Lactate *per os*, two or three grains one, two or three times a day. Many cases do not need an injection oftener than once a fortnight.—E. E. Prest, B.M.J. ii./22,283. See also T. C. Graves, L. ii./22,957.

Empyema, ischio-rectal abscesses, and hay fever have been well treated with Colloidal Calcium.—E. E. Prest, B.M.J. ii./27,958.

Calcium Oleate (✱COLLOBELL) 0·05%. *Dose.*—*per os,* ½ or 1 drachm; hypodermically 0·25 to 1 Cc.

Copper Solution, Colloidal. *Martindale.* Strength 1 in 2,000. *Dose.*—5 Cc. subcutaneously, ½ to 1 Cc. intravenously, to be isotonised at time of use. **Sterules 5 Cc. are made.**

Keeping Properties.—Our experience is that this solution keeps only when sterilised and subsequently filled into sealed containers.

Pharmacology.—From data, the detail of which is given Edn. XVIII, p. 378, it has been shown that 5 Cc. is tolerated by a cat intravenously or intramuscularly.

Isotonisation of the solution is preferable to the omission of salt.

Uses.—For injection into inoperable malignant growths.

It has been held that Colloidal Copper on the surface of its particles may supply oxygen necessary to prevent abnormal cell growth, as in malignant disease. The metal can be found in a growth after injection near the seat of infection.

Drage found the solution therapeutically active. 5 Cc. injections were made twice weekly to a patient suffering from advanced carcinoma of the liver with improvement and diminution in size of growth.—L. i./14,1651.

Recurrent cancer growth. Thirty-four injections of Colloidal Copper caused disappearance of a nodule on the liver.—C. Mansell Moullin, B.M.J. i./18,427.

✱**Cuprase** (T.M. 386445).—Ampoules contain 5 Cc. for a dose, or commence with 2½ Cc. only.

A suspension of French make of Colloidal Copper Hydroxide used subcutaneously in cancer. Give Cocaine 1/6 grain first.

Serious effects from use of Cuprase have been reported. For references see 17th edition.

We know of a case in which Cuprase was employed where there had been very short expectation of life. The patient recovered. Injections were made in the abdominal wall, the growth being in the chest.

Gold.

Manufacture.—We devised the following :—

Neutralise a Gold and Sodium Chloride Solution with dilute Sodium Carbonate Solution and adjust the strength to 0·05% Au. With 10 parts of this solution mix 10 parts of a solution containing the calculated amount of Formaldehyde required to reduce the Gold, reckoning 3HCOH to 2 molecules of the Gold Compound. Employ Gelatin as protective. Warm to effect reduction. It can be boiled to sterilise. The finished Hydrosol is to contain 0·025% (1 in 4,000) Gold and the same amount of protective. It is **red** in colour.

Physiological Report.

Rabbit, Wt. 2·3 *kg.* injected intravenously on successive days with 2 Cc., 3 Cc., 4 Cc., 5 Cc., 7·5 Cc., and 10 Cc.

Result.—Well tolerated except for slight dyspnœa after the dose of 5 Cc. Two days after the last dose (10 Cc) of Colloidal Gold this rabbit was given 10 Cc. of Colloidal Selenium, which produced slight dyspnœa.

Sterules of Colloidal Gold Solution 0·025% containing 5 Cc. are prepared and are suggested for injection. The solution may be approximately isotonised by adding 1 Cc. of 5·5 per cent. Sodium Chloride Solution at the time of use. **Sterules** of this **Salt Solution** are made.

Dose.—Suggested 5 Cc.=0·00125 Gm. ($\frac{1}{50}$ grain approx.) increased, intramuscularly or intravenously.

Uses.—See Therapy in general—*antea.*

Neurasthenia, Alcoholism and Morphine Habit treated by Colloidal Gold. In epilepsy, alcoholic neurasthenia and migraine this colloidal preparation has been given *hypodermically* four times daily (usually, 2 Cc. divided over the day, but this may be increased) with bitter tonics and digestives, every two hours, *per os.* Details of remarkable cases. Natural sleep was restored, appetite returned and nervous symptoms disappeared ; no ill effects.—D. E. Stanford Park, L. i./22, 691. See also Jl. of Inebriety, April '24.

Tests against control inert isotonic solutions similarly coloured showed that patients treated with Gold picked up more rapidly and were more successful.—P. Bonsfield, L. ii./25,1150.

Addiction of long standing cured.—D. E. Stanford Park, L. ii./26,121. See also our p. 561.

Iodine. (*Non-Metal.*)

Colloid Iodine Sol 1 in 2,000.—*Martindale.*

Dose.—1 to 4 drachms (**4 to 15 Cc.**) diluted *per os. Not suitable for intravenous use.*

Manufacture.—We devised the following :—

Dissolve Sodium Iodide and Hydrochloric Acid (*B.P.* '14) of each 1·18 Gm. in 3% Glucose Solution 250 Cc.

Dissolve further, Sodium Nitrite 0·543 Gm. in 250 Cc. of the same strength Glucose Solution. Add this solution to the former. Finally dilute the liquid to 2,000 Cc. with 3% Glucose Solution.

The Nitric Oxide evolved is removed. The Iodine is in a nascent active condition. Sodium Chloride formed in the reaction is practically 0·045%, *i.e.* $\frac{1}{20}$ approx. of that of Normal Physiological Saline.

Protective.—We have experimented with other protectives, but Glucose offers the best properties.

Tests.—To 5 Cc. of a Colloidal Iodine preparation in a test tube add ½ Cc. Carbon Bisulphide or Chloroform, shake and allow to separate. The solvent will be of a fairly deep violet colour, which is not increased by adding a little Sodium Nitrite and Hydrochloric Acid, showing that all the Iodine is in the free condition.

The Iodine in preparations of commerce found to be far below the strength stated and not in the colloidal form.—Prof. A. J. Clark, B.M.J. i./23,273.

✱Collosol (T.M. 350478; 'Collosols,' T.M. 473310) **Iodine** is supplied in liquid and paste, ointment and oily form.

Dose.—1 to 4 drachms (4 to 15 Cc.) twice or thrice daily after meals. Intravenously 10 to 200 Cc.

Uses.—As a substitute for alkaline Iodides, *e.g.*, in syphilis, rheumatic affections, tuberculosis, bronchial and nasal catarrh.

For rheumatic affections the preparation is advised by iontophoresis. Collosol Sulphur to be given internally. For catarrh, the effect is to render mucous secretion more fluid and less adherent.

Intravenously as much as 300 Cc. have been injected with impunity in cases of pyæmia and also to produce softening of fibrous tissue.

Pasta Collosol Iodine (PASTE FORM) for local use only.

For long standing ulcers effect is rapid. It is suggested to apply alternately with the similar preparation Pasta Collosol Argentum for bactericidal effect. The *oil form* (3%) and *ointment* are used for chilblains and ulceration.

Colloidal Iodine in Oil (✱COLLOBELL) 3%. For chilblains.

Iron.—It is a difficult matter to produce a stable Hydrosol of *Metallic Iron* by chemical means.

Discussion about a Collodial Iron. A piece of litmus paper needed.—Sir W. J. Pope and Prof. A. J. Clark, B.M.J. i./23,731.

Liquor Ferri Dialysatus, B.P., '85, is a colloidal solution of Ferric Hydroxide, unprotected.

Colloidal Ferric Hydroxide (✱COLLOBELL) 0·1%. *Dose.—per os*, 1 drachm. In anæmia.

✱IDOZAN (T.M. 419403). Described as a 'Colloidal Iron Concentrate,' containing 5% of Iron.

Dose.—1 drachm thrice daily after meals, increased to 1 tablespoonful.

Has been used in the treatment of anæmic conditions, especially such as are due to an impaired regeneration of blood.

Lead.

Pharmacology.—A colloidal preparation, actually *Lead Albuminate*, of strength 1 in 500, prepared by us in 1926, in Sterule form 2·5 Cc. with 0·1% Tricresol, was found to be remarkably tolerated by rabbits. A total of 0·03 Gm. of actual Lead in the form of Albuminate was tolerated. No anæmia was produced.

A similar strength preparation of Lead, as *Lead Sulphide*, which we made, was also tolerated in the same dose. In this instance there was found some impairment of the organs, liver, etc., on *p.m.* examination.

Lead Treatment of Malignant Disease.

The following are in approximate chronological order:

Malignant neoplasms appeared to be arrested by **Colloidal Lead Intravenously.** There is support of the suggestions in the abortifacient action of Lead.—Prof. W. Blair Bell, L. ii./22,1006. Men who inevitably inhale lead during their work are apparently immune. Lead thought to be the best agent known at the time for destroying chorionic epithelium, and therefore, it is thought, malignant cells.—L. ii./24,139.

The toxic effects of Lead administered intravenously, using Lead Acetate, Colloidal Lead, Lead Iodide, and compounds of Lead with Thyroiodin and

Hæmoglobin.—Prof. Blair Bell, W. R. Williams and L. Cunningham, L. ii./25, 793.

The preparation at first issued by the British Collosol Co., Ltd., contained a large amount of Gelatin, and therefore set. Sodium Hydrosulphite was added to prevent the formation of Lead Hydroxide. The preparation had toxic properties of its own.—Prof. Blair Bell, B.M.J., ii./26,936.

The supposition that Lead Salts have a greater affinity for Lecithin than for any other cell constituent would *require more considerable proof* than has yet been adduced. No account of mode of preparation of the Colloidal Lead.—B.M.J., ii./25,962.

The specific character of malignant neoplasia, and the action of Lead on malignant growths.—Prof. Blair Bell, L. ii./25,1003.

Prof. Blair Bell adopted the unfruitful trophoblastic (or chorionic) hypothesis of the nature of cancer which was first put forward by J. Beard (L. i./02,1758).—J. A. Murray, L. ii./25,1142.

Intravenous injections of a **Colloidal suspension of Lead ("M.A.")** containing 0·1% Mercury and 0·1% Lead, *i.e.*, 1½ grains of Lead per 100 Cc., and a similar quantity of Mercury, combined with X-Ray treatment, gave a decidedly beneficial effect in a case of inoperable cancer. The dose ranged from 2 to 20 Cc., a total of 368 Cc. of Colloidal Lead, containing 5½ grains of Lead, being given over a period of nearly two years. Minimum danger of immediate shock or toxicity. Lead Nitro-benzoate ("N") tried, but discontinued owing to its causing gastric discomfort even in very small doses.—F. Coke and J. B. Cook, B.M.J., i./26,416.

15 Cc. doses of a solution of not less than 0·5% Lead used with no unpleasant reaction. It is important to avoid bad colic, vomiting and poisoning due to the use of soluble salts.—Frank Coke and J. B. Cook, B.M.J., i./27,818.

The connection of lead poisoning with the comparative immunity of lead workers from cancer.—Prof. Blair Bell, B.M.J., i./26,432.

Debate at the Medical Soc. of London.—B.M.J., i./26,568.

The ***fatal amount of lead*** is a little more than 0·2 Gm. when given in a *single dose.* Intravenous use.—Prof. Blair Bell, L. i./26,537.

The ordinary resting cells obtain their energy by oxidation processes, but the cancer cell by glycolytic. It is a striking fact that though there might be an occasional case of cancer among lead workers it is of the utmost rarity. Hoffmann, in America, reported that *out of* 25,000 *certified cases of lead poisoning there was not a single case of cancer.* After 0·15 Gm. Lead has been given in treatment, a relatively large amount is excreted in the urine, but not more than a trace in the fæces.—Prof. Blair Bell, L. Cunningham and others, L. i./26,657.

A. Leitch very sceptical of the whole matter, L. i./26,658.

Use of Colloidal Lead in prevention of recurrence of malignant disease after operation is a matter so important that every case subjected to operation for cancer, whether the disease be believed to be totally eradicated or not, should be treated as if the patient still had the disease: the action of Lead is probably quantitative. There is an extraordinary difference in susceptibility to toxic effects of Lead in patients. As heavy doses and as much Lead as can be tolerated has to be given. Thirty-one cases out of 200 believed cured between Nov. 1920 and Nov. 1925.—Prof. Blair Bell, B.M.J., i./26,687.

Liverpool Cancer Research Organisation.—Fresh cancer tissues have a higher electrical conductivity than normal tissues. This tends to indicate increased permeability. The lead suspension in use at Liverpool contains metal, hydroxide, and a little carbonate and is made electrically. The final ***suspension*** is of strength ***0·5% Lead.*** In serum, the Lead in suspension is converted to the extent of 85% into Lead Phosphate, $Pb_3(PO_4)_2$. It then may perform the function of rendering the tumour less permeable and tend towards the production of encapsulation.—W. C. M. Lewis, B.M.J., ii./26,920; L. ii./26,281.

Plans, Co-ordination of Workers, etc.—Prof. Blair Bell, B.M.A. Meeting, B.M.J. ii./26,919.

5 Cc. of a 0·5% Colloidal Lead preparation is given without effect intravenously to rabbits, but colloids differ. The preparation of Prof. Lewis found safe intravenously, but slow injections desirable.—Prof. W. J. Dilling, B.M.J., ii./26,924.

Histological Changes in Cancer Tissues under Lead.—Most human patients with malignant disease complain of pain in the region of the neoplasm within a few hours of the intravenous injection. At least 40% of the Lead given intravenously to cats is deposited in the liver within two hours of injection. Details of examination of a human case 30 hours after treatment. —E. E. Glynn, B.M.J., ii./26,928.

Colloidal Lead in sublethal doses produces profound changes in animal (rat) tumours—in a small percentage of cases leading to permanent cure. The necessary dose also induces serious, but not irreparable changes in the liver and blood-forming organs.—F. C. Wood, B.M.J., ii./26,928.

Clinical effects of Lead in treatment.—Dosage has been two doses of 20 Cc. and two of 15 Cc. when possible, at an interval of 10 days between each. Then a month's rest. At the end of this time suitable doses amounting to 10 Cc. at intervals until a total of 120 Cc., *i.e.*, 0·6 Gm. of Lead, is reached. In cases where the tumour is of slow growth give smaller doses from the first. Interesting data of cases, showing arrest of growth, etc., in 41 of 227 cases treated.—L. Cunningham, B.M.J., ii./26,931.

A method of preparing Colloidal Lead by subjecting a solution of Gelatin 0·4% and Glucose 0·5%, adjusted to pH 7·2 to 7·6, to the high frequency arc between Lead electrodes of about 10,000 volts, the solution being kept cold. The colloid is brown-black in colour, and is not readily oxidised.—F. Bischoff and N. R. Blatherwick, Jl. Ph. & Exp. Ther., May '27,27.

A note on the action of **Lead Selenium Colloid** on cancer.—A. T. Todd, L. i./27,575.

The matter is still under discussion. It may be possible to provide further information in Vol. II., *q.v.*

Colloidal Lead Iodide, containing 0·2% Lead, isotonised by means of Glucose, and containing a trace of Thyroid Extract (less than 0·02%) and a trace of Cresol as preservative, injected intravenously in inoperable carcinoma with complete absence of reaction, and with beneficial results in selected cases, *e.g.*, growths of the solid variety or in the solid viscera, or in situations which are not vital.—D. C. L. Fitzwilliams, B.M.J., i./27,758.

Colloidal Lead Phosphate as a substitute for Colloidal Metallic Lead was relatively non-toxic to rats and rabbits. Method of preparation given.—F. Bischoff and N. R. Blatherwick, Jl. Ph. & Exp. Ther., Sept., '27,361.

Manganese.

Colloid Sol Manganese.—*Martindale,* 1 in 400.

Manufacture.—By double decomposition of Manganese Chloride and Sodium Hydroxide, using Glucose as protective. Supplied in two separate solutions each containing 0·5% Phenol.

The Sodium Chloride Content is 0·53%. For use, mix equal quantities of the two solutions.

PHYSIOLOGICAL EXPERIMENTS.

Subcutaneously in rats 1 Cc. of combined solution given on two consecutive days produced only slight malaise and the animal recovered completely.

Intramuscularly, in cats under observation three weeks, 2 Cc. doses of combined solution at weekly intervals were followed by loss of appetite. There was, however, complete recovery. Effects in man should be carefully watched before giving large or frequent doses. It has not, however, appeared in these experiments that 2 Cc. doses would be dangerous for man unless prematurely repeated.—May 11/20.

✱Collosol Manganese is supplied in two solutions, to be mixed at the time of use, producing a 0·25% solution.

Uses.—Gonorrhœa and sequelæ, also eczema, acne and quinsy, have been treated by it—(*cf.* Pallamine).

Gonorrhœal ophthalmia treated by Colloidal Manganese 1 Cc. intramuscularly, repeated, with success.—D. M. Livingstone, B.M.J. i./19,404. Boils cured by Collosol Manganese.—B.M.J. ii./18,160.

Antral and other suppuration treated by injections into subcutaneous tissues, intermuscular septa or the periosseous tissues.—E. Watson Williams, Pr. May, 1920.

Boils and suppurating glands treated by Colloidal Manganese intramuscularly, ½ Cc. doses. May be very painful.—H. E. Waller, Pres. June, '20.

Hodgkin's disease well treated after Sodium Cacodylate had failed to improve.—R. Samut, L. i./22,17.

Psoriasis treated—6 to 16 intramuscular injections.—J. Moore, B.M.J. ./22,41. Urticaria treated.—B.M.J. ii./23,563.

Mercury.

Manufacture.—By reducing Mercuric Chloride with Hydrazine, employing Gelatin as protective. Dialyse subsequently and adjust to 1 in 2,000.

Physiological Report.

Rabbit wt. 2·0 *kg.* injected (intravenously on successive days) with doses of 2 Cc., 3 Cc., 4 Cc., 5 Cc., 7·5 Cc., and 10 Cc. (all isotonised).

Result.—Well tolerated except for apparent dyspnœa after the 5 Cc. dose.

Sterules of Colloidal Mercury Solution are prepared containing 5 Cc of 1 in 2,000 Solution=0·0025 Gm. (1/25 grain) Colloidal Mercury. May be isotonised at the time of injection by 1 Cc. of 5·5% Sodium Chloride Solution.

Dose.—Suggested, 5 Cc.=0·0025 Gm. ($\frac{1}{25}$ grain) intramuscularly or intravenously.

Uses.—In syphilitic affections; see also Therapy in general, *antea*, and **Collosol Hydrargyrum,** *postea,* under Collosol Argentum.

Palladium, Colloidal Palladium. *Syn.* **Pallamine.**

Colloidal Manganese is most efficacious in gonorrhœa in the acute stage, but as there is delay after injecting it before its maximum oxidising power is reached, Palladium has been suggested to precede.—J. E. R. MacDonagh, B.M.J. ii./18.31.

EPILEPSY well treated by Pallamine. ½ Cc. doses intramuscularly at 3 day intervals.—A. C. King-Turner, B.M.J. ii./18,255.

Platinum.

Manufacture.—This Colloidal Solution we found best prepared chemically by reducing a Platinous Salt, *e.g.*, Chloro-Platinite of Potash of commerce with Hydrazine in the presence of Gelatin as protective. A Colloidal Solution made in this way after previous dialysis can be adjusted to strength 1 in 4,000 (0·025%).

Physiological Report.

Rabbit wt. 2·3 *kg.* injected intravenously, on successive days, with doses of 2 Cc., 3 Cc., 4 Cc., 5 Cc., 7·5 Cc., and 9 Cc.

Result.—Well tolerated except for slight dyspnœa after the largest dose.

Sterules of Colloidal Platinum containing 5 Cc. of 0·025% solution are prepared=0·00125 Gm., Platinum (1/50 grain). May be isotonised for use with 1 Cc. of 5·5% Sodium Chloride.

Dose.—Suggested, 5 Cc.=0·00125 Gm. ($\frac{1}{50}$ grain) intramuscularly or intravenously.

Uses.—See Therapy in general—*antea.*

Intravenously 3 to 7 Cc. Colloidal Platinum caused a rigour in ½ hour followed by rise in temperature to 104 or 105° F. with perspiration, sickness and headache. Temperature then fell to subnormal—this reaction occurred both in normal subjects and those suffering from diseases characterised by moderate pyrexia—namely subacute pleuritic and pneumonic conditions and protracted paratyphoid fever—the fall of temperature coincided with a great improvement in the general condition to a great extent—results attributed to a great extent to the Peptone used as protective.—A. G. Auld, B.M.J. i./18,195.

Selenium.

Manufacture.—An Alkali Selenide is treated with acid in presence of protective colloid. The colloidal solution is to be isotonised with Saline at the time of use, to render it approximately isotonic with the blood.

Physiological Report (1915).

Rabbit wt. 2·1 *kg.* injected intravenously, on successive days, with 2 Cc., 3 Cc., 4 Cc., 5 Cc., and 7·5 Cc., respectively.

Result.—Tolerated without ill effect. Selenium was also administered to the rabbit which had previously been injected with **Colloidal Gold**, *vide antea.*

We recently (1927) had a further investigation conducted. The report was to the effect that 3·5 Cc., 5 Cc. and 10 Cc. injected into the ear vein of a rabbit at about 1 hour intervals were tolerated and the preparation was hence deemed *entirely non-toxic.*

Sterules of Colloidal Selenium are prepared containing 5 Cc. of 1 in 5,000 Solution=0·001 Gm. (1/64 grain) Selenium. The solution may be approximately isotonised by adding 1 Cc. of 5·5% Sodium Chloride Solution at the time of use. **Sterules of this Concentrated Saline** are prepared.

Dose.—Suggested, 1 to 5 Cc. hypodermically, intramuscularly, or intravenously.

Uses.—Has been suggested for use in malignant disease—see also Therapy in general—*antea.*

A preparation of colloidal selenium was tried on mice and rats with grafted malignant growths, but without effect. This preparation was non-toxic whereas that of Wassermann (Selenium and Eosin) is described as being highly toxic. Other compounds of selenium and eosin, found by experiment to be toxic, were tried, but none of these had any selective action on the tumour cells.—C. E. Walker, L. i./12,1337.

Collosol Selenium effected diminution of pain when used intramuscularly and intravenously.—E. Watson-Williams, B.M.J. ii./10,463,516.

Malignant disease treated by 'Selenium.' Large doses (5 Cc.) 'spell disaster.' Temporary improvement only can be expected.—A. S. Gillett and C. P. G. Wakeley, L. i./22,804; B.M.J.E. ii./22,15.

Intravenous injections daily for 10 days of 5 to 10 Cc. of a 1 in 2,000 isotonic solution definitely and undoubtedly ameliorates patient's condition and prolongs life in many cases of gastric cancer. Absolutely safe and no contra-indications. Repeat treatment after interval of 10 days or a fortnight. Three courses may be given in 3 months, and possibly more, depending on progress of patient.—Stanley Wyard, Diseases of the Stomach, p. 358.

Silver.

Manufacture.—Mix 250 Cc. of 30% Ferrous Sulphate Solution with a Solution of 140 Gm. Sodium Citrate in 250 Cc. of Water. Pour this mixture into 250 Cc. of 10% Silver Nitrate Solution with continual stirring. Wash by decanting with Sodium Citrate Solution 5%, dissolve precipitate in Water, and precipitate again with Sodium Citrate (twice), until it is practically free from Iron. In this manner a dark grey colloidal solution of strength 1% is prepared, which must contain protective Colloid. Finally adjust to the strength 1 in 2,000 for use.

As an alternative it is stated that well washed Silver Oxide may be reduced by a rapidly stirred 60% Formalin.—A. Pickles, Chem. News, 1918, 117, 358. Y.B.P. 1919, 109.

Physiological Report on our Preparation.

Rabbit wt. 1·85 *kg.* injected intravenously, on successive days, with doses of 2 Cc., 3 Cc., 4 Cc., 5 Cc., 7·5 Cc., and 10 Cc. (all isotonised).

Result.—Well tolerated except for slight dyspnœa after largest dose.

Sterules of Colloidal Silver containing 5 Cc. of 1 in 2,000 Solution are prepared. May be isotonised with 1 Cc. of 5·5% Sodium Chloride Solution.

Dose.—Suggested, 5 Cc =0·0025 Gm. ($\frac{1}{25}$ grain) intramuscularly or intravenously.

Uses.—In gonorrhœa and cystitis *cf.* also Therapy, p. 368.

Collosol Argentum (1 in 2,000).

Dose.—Hypodermically 15 or 30 minims (**1 or 2 Cc.**). *Per os*—One drachm (**3·5 Cc.**) (on an empty stomach, as it inhibits digestion). GARGLE.—One part diluted with three of water. (Dilution is necessary on account of frothing of Collosols.) EYE DROPS.—A few drops instilled between the eyelids or as douche diluted with 3 times quantity of water. *Locally.*—Undiluted or diluted with 3 to 4 parts of Saline Solution (1%), as a swab or lotion.

It is chemically prepared. Precipitation by the blood does not occur immediately on hypodermic or intravenous injection.

Uses.—For septic wounds, gonorrhœa (et sequelæ), cystitis, dysentery, hæmorrhoids, and nose, ear, eye, mouth and skin infections. Pyorrhœa alveolaris has been treated by 2 to 3 minim injections into the sockets of the teeth. Sprue has been treated by internal use. Whooping cough has been treated by spraying.

Bactericidal power. Destructive to the *meningococcus*, also anthrax and typhoid organisms. After 2 Cc., and subsequently 3 Cc., injections intravenously in rabbits, the particles could be found in the cerebro-spinal fluid, brain and urine.

It is stated that the electrically prepared suspensions differ in being precipitated by Sodium Chloride in dilute solution.

Successfully treated *topically* were—Septic and follicular tonsillitis, Vincent's angina, phlyctenular conjunctivitis, gonorrhœal conjunctivitis, spring catarrh, impetigo contagiosum, acne of face and body, septic ulcers of legs, ringworm of body, tinea versicolor. Soft sores, suppurative appendicitis after operation (the wounds cleaned rapidly). Pustular eczema of scalp and pubes, chronic eczema of external meatus of ear with recurrent boils, also chronic eczema of anterior nares. Offensive discharge in case of chronic suppuration in otitis media, bromidrosis of feet and axillæ. Blind boils of neck. *By injection*—Gonorrhœa and chronic cystitis (local), boils, epididymitis.—C. E. A. Macleod.

PYORRHŒA cured by 15 minims of Collosol Argentum hypodermically in the arm. Corneal ulcer with acute inflammation disappeared by 2 drops in the eye. Septic diarrhœa following intestinal obstruction and successful removal of appendix stopped by 20 minims hypodermically. Useful as nose spray for post nasal catarrh and for simple nasal catarrh. Abscess on the hand due to bullet wound well treated.—A. H. Boys, B.M.J. ii. 16,586,924.

Septicæmia followed abortion treated by 10 Cc. Collosol Argentum intramuscularly.—J. Fine, B.M.J., ii./25,1005.

Pasta Collosol Argentum is also made for use to wounds, burns, skin affections, chilblains and hæmorrhoids. Acne has been well treated.

Collosol Hydrargyrum is of similar strength, dose and properties.

Collosol Silver and Mercury have considerable antiseptic action but little bactericidal. The experiments for the antiseptic action were done by adding the test organism to the preparation or its dilution and then after 5, 10, etc. minutes, broth was inoculated. For the *bactericidal* effect the preparation was added to the nutrient medium and then inoculated with the organism.—Prof. C. R. Marshall & G. B. Killoh, B.M.J. i./15,102.

Collosol Argentum Beta is 1 in 400, *i.e.*, 5 times the strength of the ordinary preparation. It is directed to be diluted with warm water or normal saline.

Sulphur.

Manufacture.—A 1 in 1,000 opalescent Colloidal Sulphur Solution is made by decomposition of a mixture of Sodium Sulphide and Sodium Sulphite with acid in the presence of protective colloid.

Sterules containing 2 Cc. of 1 in 1,000 solution isotonised at the time of use with 0·4 Cc. of 5·5% Saline. *Dose suggested,* 1 to 5 Cc. (=0·001 to 0·005 Gm.).

For use in skin affections and wherever Sulphur is indicated through excessive elimination.

Sulphur Collosol (1%).

Dose.—Per os 2 to 4 drachms (8 to 15 Cc.) in a wineglass of water twice daily during or after principal meals. Subcutaneously or intravenously, 1 to 2 Cc.

Uses.—Colloidal Sulphur it is claimed is a very active form of Sulphur which readily combines with protein and is entirely absorbed in the stomach. Rheumatic and skin affections are relieved.

SCROFULOSIS.—When secretion from the eyes is present suggesting bacterial infection, 1% Collosol Sulphur as drops for the eyes or instillation into the nasal cavities useful.—P. A. Harry, Pres., June, '20.

MUSCULAR AFFECTIONS treated by 1 Cc. doses of 1 in 1,000 Colloidal Sulphur as made by the writer's (J. D. Comrie's) method—L., June 30,'17—with good results.—Pres., June, '20.

NEURITIS.—Encouraging results obtained by Colloidal Sulphur intramuscularly. Irritating malarial rigor followed, and its use is suggested in dementia paralytica in place of malarial inoculation.—D. F. Tutunji, L. ii./25, 408.

For Injections in rheumatism, v. also Sulphur chapter.

The ✱ "**Oscol**" (T.M. 305256) brand of Colloids includes Antimony, Silver, Copper, Mercury, Iron, Iodine and Sulphur.

Oscol **Silver** has been used in gonorrhœa, phthisis, pneumonia, bronchitis, pyorrhœa alveolaris, hay fever, septic conditions of the nose, wounds, throat and ear, and in cystitis and acne. Oscol **Copper** in cancer. Oscol **Mercury** in syphilis and tonsillitis. Oscol **Ferrum** in chlorosis and debilitated conditions. Oscol **Iodine** in all cases where this halogen is indicated. Oscol **Sulphur** in rheumatic affections.

(2) ELECTRICALLY PRODUCED.

General Directions.—

In making these colloidal solutions electrically, by working from the main, our experience is that the intensity of current necessary is considerable—the ordinary wiring for lighting is not sufficient. Special wiring is required as in the case of a power circuit. With this latter, resistance can be introduced so as to adjust the intensity to about 8 ampères. The intensity necessary varies with the type of metal. Pure Distilled Water must be used and the electrodes must be so arranged as to produce a uniform arc beneath the surface. After sparking for sufficient time the solution is standardised.

Antimony, Colloidal, made by sparking from an induction coil through Antimony under Chloroform. Possesses trypanocidal properties.—U. N. Brahmachari, L.ii./16,728. I. Med. Gaz., May, 1916. See also Antimony Colloidal chemically produced.

Copper.—We prefer the **Chemical Method** for this—*q.v.*

Electrocuprol.

Dose.—1 to 20 Cc. intravenously, isotonised with Saline.

A brown solution described as a colloidal solution of Copper Oxide containing 0·15% Copper. Ampoules 5 and 10 Cc. are prepared.

Uses.—In malignant disease and tuberculosis.

Gold.—We have prepared Colloidal Gold Solution electrically, as described under general directions, the product being of a dark bluish purple colour. A solution was prepared 1 in 4,000 strength, to be isotonised with Sodium Chloride Solution. See chemically produced in preference, p. 371.

Uses.—*Vide* Therapy in general—*antea.*

***Orargol** (T.M. 453759).

Ampoules contain 5 Cc. for intramuscular or intravenous injection. A preparation of Colloidal Gold (0·01%) and Silver (0·09%). It is stated that if injected in time it will cut short a serious case of pneumonia, influenza, or erysipelas. Has also been used in bronchitis, endocarditis, and acute articular rheumatism.

Encephalitis lethargica of severe type successfully treated by injections of Electro Colloidal Gold and Silver.—A. W. Fuller, L. ii./26,172.

Iodine.—The following are available. (See also chemically produced.)

Iodeol.—An electrically prepared Colloidal Oily Iodine Solution containing 0·2 Gm. of Iodine per tube of 1 Cc.—a dose by intramuscular injection Has been used in pulmonary and rheumatic affections.

It is stated that 10 minutes after "application upon the skin" Iodine can be found in the urine.

Capsules containing 0·25 Gm. Iodine, and **Ovules**, are prepared

Iodargol is similar, containing 0·4 Gm. of Iodine per tube. Stated to be a non toxic, painless solution for injection by means of an urethral syringe in gonorrhœa and allied infections.

Iron.—We doubt if it is possible to prepare a true metallic Iron colloid in an aqueous medium electrically.

Mercury.—Our experiments showed that the electrically prepared colloid is difficult to obtain and not more satisfactory than the *chemically prepared* product, *q.v.*

Selenium.—The electrical method is unsuccessful. *Vide* the **Chemical**, *antea.*

Silver.—With this element we found the disruption of particles proceeded readily and a 1 in 2,000 solution can be made. The **Chemical** method is however preferable.

***Electrargol** (T.M. 351388).—A reddish brown solution ('stabilised') containing 0·025% of Silver.

Dose.—1 to 10 Cc. intramuscularly, after rendering isotonic with saline (supplied). Ampoules 5, 10 and 25 Cc.

Uses.—In diseases of the genito-urinary organs and infective diseases in general. Intrapleural injections of 15 to 50 Cc. have been made in pleurisy.

Electrargol given intravenously, up to 50 Cc. in 24 hours, gave favourable results in small-pox.—Jl. Trop. Med., Dec. 1/27,306.

F. Antiseptic Powers of Colloidal Solutions.

Bacteria, being colloidal in character, are negatively charged. Positively charged colloids are theoretically at all events *ipso fa to* germicides.

Colloids of the following are strong germicides: silver, mercury, mercuric chloride, mercuric cyanide, thorium, arsenious acid, antimony, cobalt, iron. The following colloids are weak germicides: aluminium, bismuth, copper, lead, zinc. And the following, it may be interesting to add, though positively charged, are non-germicides: sulphur, selenium, cadmium, gold, palladium, platinum, iridium, rhodium, tantalum, zinc, tin, magnesium, graphite. Colloid silver has the curious property, when injected intravenously, of rendering rabbits immune from anthrax and diphtheria bacilli.—Pres., June, 1920.

For further details see Antiseptic Powers, Vol. II., 'Colloidals.'

Metal Organosols and 'Lanosol' Silver.—Details in Edn. XVIII., p. 388.

Colloids and Crystalloids in relation to the constitution of the body and physiological processes, *cf.* Ionophoresis, Vol. II.

We are compelled to omit a large number of Refs.—see 17*th Edn., p.* 366, *and* 18*th, p.* 366, *et seq.*

Colloids and their use in Medicine.—R. Cecil Owen P.J. i./20 497.

Colloids in general practice.—Pres., June 1920 (there is a good Bibliographic Summary, p. 249, *et seq.*, of that issue).

The formation of colloids. A monograph by Theo. Svedberg, 1921.—Churchill, L. ii./21,28.

COLOCYNTHIDIS PULPA (*B.P.* '14).

Bitter Apple.

Dose.—2 to 8 grains (**0·12 to 0·5 Gm.**).

The dried pulp or pith of the fruit of *Citrullus Colocynthis* (*Cucurbitaceæ*) freed from the seeds. Has a markedly bitter taste, is free from starch, and contains only about 3% fixed oil or less (2% *B.P.*'14 and U.S. X.) whereas the seeds contain 15% or more. Is imported from Smyrna (the best) and Spain. According to U.S. X. must not contain more than 5% of seeds, nor more than 6% of acid-insoluble ash.

Antidotes.—Spirit of Camphor 10 drops on sugar or in milk every ¼ hour, Laudanum 30 minims (by rectal injection if not able to swallow). Stimulants, demulcent drinks, apply warmth.—Murrell.

Colocynth Poisoning. A teaspoonful and a half proved fatal

A woman took 75 grains in powder. Vomiting and diarrhœa persisted for some hours. Treatment was Arrowroot, Morphine and Atropine. After two days Chloretone in Olive Oil every six hours and a purely milk diet. Ultimate recovery. There was little abdominal pain throughout. Literature shows that nearly all cases where doses of 110 grains and over have been taken have ended fatally. Gastro-intestinal symptoms in such cases are most marked, leading to rapid collapse.—R. B. Roe, L. i./13,1527.

Uses.—A drastic cathartic. A frequent ingredient in aperient pills. For formulæ *see* Index, "Pills."

Extractum Colocynthidis Compositum (*B.P.* '14).

Dose.—2 to 8 grains (**0·12 to 0·5 Gm**).

This is in powder form, made by extraction of Colocynth Pulp, and adding Extract of Aloes, Scammony Resin, Curd Soap in powder and powdered Cardamom Seeds.

Extractum Colocynthidis. U.S. X. *Average dose,* ½ grain. Made with Diluted Alcohol, reducing the extract to powder and diluting with Starch so that 1 of extract equals 4 of drug.

Pilula Colocynthidis Composita (*B.P.* '14).

Dose.—4 to 8 grains (**0·2 to 0·5 Gm.**).

Contains Colocynth Pulp, Aloes, Scammony Resin, Potassium Sulphate, and Oil of Cloves with Water *q.s*

Pulvis pro Pilula Colocynthidis Composita consists of the ingredients of the pill less the water. Is more convenient for dispensing.

Ⓟ **Pilula Colocynthidis et Hyoscyami** (*B.P.* '14).

Dose.—4 to 8 grains (**0·25 to 0·5 Gm.**).

Compound Colocynth Pill 2, Hyoscyamus Extract 1, with Water *q.s.* This is a Ⓟ Poison—*cf.* P.J. i./26,13,23.

Ⓟ **Hamilton's Pill.**

Compound Extract of Colocynth 2, Hyoscyamus Extract 1; Made into 4 grain pills. This is stated to be less griping than the last.

Tinctura Colocynthidis, P.G.VI.

Dose.—3 to 15 minims (**0·2 to 1 Cc.**). (Maximum single dose, 1 Gm.; maximum daily dose 3·0 Gm.). Strength 1 in 10 alcohol (90%).

Colocynthin. $C_{56}H_{84}O_{23}$ = 1124·672. The active principle, a glucoside, of Colocynth in the form of an amorphous yellow powder. Has been employed as a hypodermic purgative.

Dose.—15 minims of a 1% solution in Glycerin, approximately $\frac{1}{8}$ gr.

It occurs to the extent of 0·6%. It readily reduces Fehling's Solution.

Cucumis trigonus (*C. pseudo-colocynthis*, Royle). Common in the Bombay Presidency, contains Colocynthin or body closely allied.—Naylor, P.J.ii./07,117.

CONIUM.

Hemlock. *French*—Ciguë. *German*—Gefleckter Schierling.

Both the dried unripe fruits and the fresh leaves and young branches of *Conium maculatum* (*Umbelliferæ*), collected when the fruit begins to form, were in B.P. '98.

Dose.—2 to 8 grains (**0·12 to 0·5 Gm.**). U.S. VIII. Standard 0·5% Conine. **(Conium is now removed from U.S.P.)** Fr. Cx.—*Max. single dose* 4 grains, max. during 24 hours 12 grains approximately.

Conium fruit contains 0·36 to 0·91% of Conine. A standard of 0·5% has been suggested. The fruit contains more than the leaves.

For further chemical details on Conium, see Vol. II.

[P1] **Coninæ Hydrochloridum.** Silky needles soluble 1 in 4 in water.

[P1] **Coninæ Hydrobromidum.** Fr. Cx. $C_8H_{17}N.HBr$=208·068.

Dose.—$\frac{1}{3}$ grain, increased to 2 grains (**0·02 to 0·12 Gm.**) in pill.

The hydrobromide of the liquid alkaloid [P1] **Conine** (*α-n* Propyl-piperidine), *Syn.* **Coniine, Cicutine** $C_8H_{17}N$=127·144. It was synthesised by Ladenburg. The base is soluble in alcohol, 1 in 80 of water, also in chloroform and acetone. *Dose.*—Similar to that of the salt which is in colourless crystalline prisms, soluble in water 1 in 2, nearly.

Incompatibility.—Conium preparations are incompatible with alkalies and preparations containing Tannin.

Antidotes.—Stomach tube and emetic. Give Tannic Acid and wash out the stomach again. Stimulants; artificial respiration.

Uses.—Conium and Conine Hydrobromide act as direct sedatives to the respiratory centre; in poisonous doses death is caused by asphyxia. Employed with advantage in all spasmodic affections, especially for whooping-cough and asthma; in neuralgia, epilepsy, and as a sedative in acute mania.

Ⓟ **Injectio Coninæ Hydrobromidi Hypodermica.** 1 grain in 20 minims. *Dose.*—1 to 3 minims (**0·06 to 0·2 Cc.**).

Ⓟ **Pessus Coninæ.** Conine ½ minim, Gelatin Mass 20 grains.

Ⓟ **Tinctura Conii.**

Dose.—½ to 1 drachm (**2 to 4 Cc.**).

We prepare this with Conium Fruit No. 40 powder, 1 in 5 of Alcohol 60% by percolation, and standardise to 0·1% Conine.

A quantity of Conium Fruit was made into Tincture in the usual way. It was divided into two parts, one of which was labelled and set aside. All the alkaloids were removed from the other half and afterwards dissolved in slightly acidulated water, and the solution made up with Alcohol to volume. These preparations were examined by Wm. Findlay at Aberdeen University. *There was not the slightest difference in effect* between the two. The query is put as to whether the same would hold good for any of the other so-called alkaloidal drugs ? It is suggested to produce a series of colourless Tinctures of standard strengths, containing all the alkaloids in the proportions fixed by nature.—R. Wright, P.J., i./26,256.

Ⓟ **Extractum Conii Liquidum,** B.P.C.

Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

Conium Fruit 100 in No. 40 powder is exhausted with alcohol 60% containing 1·25% of acetic acid (33%), the last portion of percolate concentrated and mixed with the first 85 previously set aside, so as to produce a Liquid Extract "containing alkaloids equivalent to 1% of alkaloidal hydrochlorides."

Ⓟ **Extractum Conii,** Fr. Cx. *Extrait de Ciguë, Dose.*—Maximum single ¾ grain (**0·05 Gm.**) approximately.

A firm Extract produced by extracting the powdered fruits with 70% alcohol at 35° C., evaporating the liquor and treating the residual extract with water, evaporating the aqueous extractive, rejecting the portion not dissolved. We found an extract which we prepared, to contain 2½% alkaloids.

Ⓟ **Unguentum Conii.**

The author's formula is as follows : Extract of Conium, Fr. Cx. a sufficiency to produce 0·1% total alkaloids in the finished Ointment, the basis of which consists of Unguentum Lanolini. Gives relief in pruritus ani, and for painful fissures.

COTO CORTEX.

Dose, in powder, 1 to 8 grains (**0·06 to 0·5 Gm.**) 4 to 6 times a day. Is imported from Bolivia. Paracoto bark is exported in place of true Coto bark—*N.O.* probably *Laurineæ.*

Botanical source of Coto Bark given as *Nectandra Coto* by Dr. Rusby. It seems probable that like the Cinchona genus there may be several allied species. —E. M. Holmes, P.J. i./23,240.

Account of Rusby's trip in the Amazon basin to determine the source of Coto bark.—C. W. Mablethorpe, P.J. i./23,238. C.D., 1923, p. 380. Possibly several species of Nectandra contain Cotoin.—Prof. Greenish, *ibid.* 381.

Uses.—For cholera, and especially the diarrhœa of phthisis, for night sweats, and for gout and rheumatism. It is rich in resins which give it a pungent taste.

Incompatible with Mistura Cretæ.

Extractum Coto Liquidum. 1=1 of bark.

Dose.—2 to 6 minims (**0·12 to 0·4 Cc.**).

Tinctura Coto, B.P.C.

Coto Bark bruised 1, Alcohol (90%) *q.s.* to 10.

Dose.—10 to 30 minims every 2 hours with mucilage and syrup.

Mistura Anti-choleraica *Royal Coll. Phys.* Form II. (L. ii./92,682). Aromatic Sulphuric Acid 15 minims, Compound Tincture of Camphor 30 minims, Compound Tincture of Chloroform, Tincture of Coto, of each 20 minims, Syrup of Orange Flower 1 drachm, Peppermint Water to 1 ounce. *Dose.*—1 ounce every 3 or 4 hours. This preparation has been found invaluable. Form I. will be found in the Xth Edition, p. 105.

Ⓟ **Diarrhœa and Cholera Mixture.** (*Board of Health.*)

Aromatic Confection 9 grains, Aromatic Spirit of Ammonia 9 minims, Tincture of Catechu 30 minims, Compound Tincture of Cardamoms 18 minims, Tincture of Opium 3 minims, Chalk Mixture to 1 ounce(=1 dose). The following are also of benefit:—

Ⓟ **Mistura Thielemani.** *Syn.* TINCTURA ANTICHOLERICA THIELEMANI. THIELEMAN'S KOLERADRAABER.

Average Dose.—30 minims (**1·8 Cc.**). Dissolve Peppermint Oil 3 in Alcohol 22 and add to Sydenham's Laudanum (Vinum Opii Crocatum *q.v.*) 10, Ipecacuanha Wine 25, Tincture of Valerian (1 in 5 of Dilute Alcohol) 40.

Ⓟ **Tinctura Anticholerica Conradi.**—CONRAD'S KOLERADRAABER.

Dose.—Over 20 years, 40 drops: over 5 years, 1 drop for each year. Must not be given to a child under 5 years.

Tincture of Opium (B.P. '98) 1, Tincture of Cascarilla and Camphorated Spirit of Ether of each 2, Bitter Tincture of Rhubarb 5.

[**Spiritus Ætheris Camphoratus** is Camphor 3, Spirit of Ether (1 in 4) 17. **Tinctura Rhei Amara** is Rhubarb 10, Cardamoms 1, Gentian 4, Alcohol (70% by vol.) 100, all by weight.]

Ⓟ **Guttæ Inosemzowi.** TINCTURA ANTICHOLERICA INOSEMZOWI. P. Bor. VII.:—

Average dose.—30 minims (**1·8 Cc.**).

Extract of Nux Vomica 1 Gm., Tincture of Opium 120 Gm., Alcoholic Tincture of Rhubarb 480 Gm., Tincture of Castoreum 20 Gm., Spirit of Ether 240 Gm., Ethereal Tincture of Valerian 240 Gm., Oil of Peppermint 5 Gm.

Pulvis Cretæ Compositus, U.S. X.

Average dose.—30 grains (**2 Gm.**).

Prepared Chalk 30, Acacia 20, Sugar 50.

Cotoin.—*Dose.*—½ to 2 grains (**0·03 to 0·12 Gm.**) every 2 or 3 hours in pill or diluted mucilage. 4 grains have been used in dysentery.

A bitter principle, in yellow crystalline powder, slightly soluble in water, soluble in alcohol. Melting point, 130° C. The dust is irritating to the nostrils.

Ⓟ CREOSOTUM.

Syn. **Kreosotum** (*B.P.* **'14), U.S. X., Fr. Cx., P.G. V., P. Austr., P. Helv., P. Dan.**

Dose.—1 to 5 minims (**0·06 to 0·3 Cc.**), increased to 30 or even 60 minims, in capsules, or in cod liver, almond, or olive oil, or emulsified.

Soluble in alcohol, chloroform, ether, glacial acetic acid, fats and oils, and 1 in about 150 of water.

Creosote (*B.P.* '14) is a mixture of phenols—chiefly guaiacol and creosol.

The variety most used is from **Beechwood.** It contains a large percentage of Guaiacol $C_6H_4.OCH_3.OH$=124·099. It mixes clear with Glycerin. It is more soluble in water than the variety from **Pinewood**, which is anhydrous and mixes perfectly with oil of turpentine, consisting chiefly of creosol $C_6H_3.CH_3.OCH_3.OH$: 1, 3, 4= 138·08 homopyrocatechin-methyl-ether (Morson's Creosote is representative of this class). Creosote does not cause collodion to gelatinise when mixed with it in equal proportion.

Commercial Creosote used for timber preservation consists of Naphthalene oils—a mixture of the heavy oil from Coal Tar distilling at 230—270°, with the residues from the middle oil (170—230°), after freeing from Phenols.

For composition of and tests for Creosote, see Vol. II.

Flavoring.—Emulsified, Glyl or Syl Pini excellent, Syl Lavandulæ and Syl Amygdalæ Amaræ are also good; Mistura Amygdalæ Composita, or Essentia Menthæ Piperitæ.

Uses.—Locally as a caustic. It is one of the most powerful deodorisers, antiputrescents, and antiseptics. It is used internally to correct fetor, given to check sickness, for diabetes, added to cod-liver oil for phthisis and applied externally in various skin diseases, and is put into the cavities of carious teeth. *Hypodermically* was administered in 10% solution in sterilised almond oil Checks gastric fermentation and is an intestinal antiseptic in some forms of diarrhœa. For irritable trachea and congested larynx, causing troublesome cough, the inhalation of creosote from an oro-nasal or 'ozonic' inhaler is useful.

Two half drachms having been taken in error is recorded.

Incompatible with silver oxide (*q.v.*). Also with calcined magnesia and slaked lime.

Aqua Creosoti. *Syn.* Liquor Creosoti. *Average dose.*—2 drachms. Creosote 1 in 100 water freshly prepared.

Elixir Creosoti—*Martindale.*

Dose.—1 to 2 drachms (**4 to 8 Cc.**) diluted at the time of taking.

Creosote 2 minims, Alcohol 90% 10 minims, Syrup of Pine (*q.v.*) and Simple Elixir, B.P.C., 1894, *a.a. p.aeg. q.s.* to 2 drachms.

Haustus (Mistura) Creosoti (Vic. Park).

Dose.—½ to 1 ounce (**15 to 30 Cc.**)

Creosote 3 to 30 minims, Alcohol 90% 15 minims, Compound Tincture of Gentian 15 minims, Liquid Extract of Licorice ½ drachm, Water to 1 ounce. (If containing 15 minims : Ⓟ).

Mistura Creosoti et Potassii Iodidi.

Dose.—½ ounce (15 Cc.) every three hours until the temperature becomes normal.

Creosote ½ drachm, Potassium Iodide 1 drachm, Alcohol 2 drachms, Liquid Extract of Liquorice 3 drachms, Water to 6 ounces.

LOBAR PNEUMONIA.—The above dose is suitable for adults; for children proportionate quantity. The antiseptic action of Creosote limits the extension of the pneumonic process. The Iodide by stimulating cell action loosens the exudate. Combined, these drugs produce quieting effect on the heart, and diuresis. The Iodide reduces blood pressure. No particular local treatment employed.—B.M.J., ii./10,1611. See also E. W. Maitland, B.M.J., ii./18,464. The Potassium Iodide content, it is suggested, should be kept down. A dose of 2 to 3 grains with the Creosote 5 minims is a good expectorant, and depressant action is avoided.—'M.D.' B.M.J. i./22,334.

PNEUMONIA and INFLUENZA well treated, 10 minims gently rubbing into the right axilla with the finger repeated on the left axilla if required 10 minims at a time, also ½ minim *per os.* Reduces temperature.—J. E. B. Wells, B.M.J., i./19,481.

Mistura Creosoti Composita.

Dose.—2 drachms every 4 hours for a child of 5 years.

Creosote 32 minims, Calcium Carbonate (precipitated) 128 grains, Potassium Iodide 16 grains, Mucilage Tragacanth *q.s.*, Saccharin 8 grains, Oil of Peppermint or Aniseed 5 minims, Water to 8 ounces.

TUBERCULOUS PERITONITIS.—In two children, apparently hopeless cases, the above was useful. Tincture of Opium or Compound Tincture of Camphor added for relief of pain and diarrhœa if present. Petroleum Emulsion and Cod Liver Oil as further treatment. Abdominal tumours diminished and general health improved. Remarkable recoveries. The mixture has also been found very beneficial in phthisis.—H. Lawrie, B.M.J., ii./13,1433.

Oleum Morrhuæ cum Creosoto.

Dose.—1 to 4 drachms (**4 to 15 Cc.**). Contains 1½%.

In ulcerative colitis, Creosote 3 minims, with Cod Liver Oil 1 drachm thrice daily—Castor Oil having been previously given—increased by 1 drachm daily, until on the 4th day 12 minims with ½ ounce respectively are taken combined. Has proved useful.

* **Pautauberge's** (T.M. 242453) **Solution.**

Dose.—A tablespoonful (containing 2 minims of Creosote and 8 grains of 'Calcium Hydrochloro-Phosphate.')

Ⓟ **Perles of Creosote.** 1 or 3 minims in each, with oil, also **Capsules,** 3 and 5 minims, or more, with oil.

Ⓟ **Creocarb Capsules.** Contain Beechwood Creosote 3 minims and Phenol ¼ gr. In the treatment of phthisis.

Pilula Creosoti—*Martindale.*

Dose.—2 to 6 grains (**0·12 to 0·4 Gm.**).

Creosote 1, Curd Soap, in powder, 1. Digested on a water-bath in a wide-mouthed stoppered bottle. As prophylactic against dysentery, *e.g.*, by soldiers on the march.

To make a pill containing Creosote 2 minims and Phenol 1 grain, use White Wax 2½ grains and Powdered Liquorice 1 grain. Incorporate the Phenol, Creosote and Wax with the powder gently and quickly.—P. Boa.

Spiritus Creosoti.

Dose.—1 drachm. Creosote 1, Alcohol 90% 40. Lessens cough and expectoration in chronic bronchitis and phthisis.

Petrolatum Creosoti—*Martindale.*

1 of Creosote in 10, employing "*High Melting*" Soft Paraffin.

Unguentum Creosoti.

Creosote 6 drachms. Yellow Wax 180 grains. Melt, and stir till cold. Used in psoriasis. Caution.—Should not be applied to the abdomen, face, or flexor surfaces of the limbs.

Ⓟ **Vapor Creosoti,** T.H.

Creosote 80 minims, French Chalk 30 grains, Water to 1 ounce C.L.T.E. has Creosote 40 minims, Light Magnesium Carbonate 20 grains, Water to 1 ounce.

A teaspoonful (C.L.T.E. a tablespoonful) in a pint of water at

140° F. Useful in chronic congestion of the larynx and trachea, and in ozœna, fetor of breath and syphilitic throats.

Abscess of lung. Creosote internally in doses up to ½ drachm, together with inhalations of Creosote and Iodine.—L. i./07,1021.

For phthisis, it is more sedative in its action if mixed with an equal volume of spirit of chloroform, 5 to 20 minims employed at one time.

Ⓟ **Vapor Creosoti Compositus** (*Syn.* INHALATIO IODI COMPOSITA L.H., VAPOR ACIDI CARBOLICI COMPOSITUS in earlier Edition).

Creosote 2, Carbolic Acid 2, Iodine Tincture 1, Spirit of Ether 1, Spirit of Chloroform 2.

For early pulmonary tuberculosis inhalation of antiseptics from a "Burney Yeo" inhaler **was** recommended by Lees. *It must be continuous and in operation the whole of the* 24 *hours*, excepting meal times. Six to 8 drops are used on the sponge of the inhaler every hour during the day, and two to three times during the night if awake. Non-irritating, beneficial and does not cause hæmoptysis. Allays pyrexia and cough. Should hæmorrhage occur, Yeo's suggestion to add turpentine should be remembered.

The antiseptics make their way into the pulmonary alveoli and the slow absorption of the anæsthetic solvents in a dilute condition carry with them the antiseptics into the blood and by the blood stream to the tuberculous foci. The Alcohol used as one of the solvents must be considered as tonic and stimulating as also the Ether. The Chloroform is locally sedative and reduces cough.

Guaiacol, Phenol and Spirit of Chloroform, adding Turpentine when necessary, have also been used.

Ⓟ **Vapor Chloroformi Compositus. L. H.**

Chloroform 10 minims, Liquid Phenol 25 minims, Alcohol 90% 50 minims, Glycerin 35 minims. Quantity for one inhalation: 60 minims, to be added to a quart jug half full of boiling water for inhalation.

Ⓟ **Guttæ Cinnamomi Compositæ.**

Creosote 2 drachms, Pine Oil 1½ drachms, Spirit of Chloroform 1½ drachms, Menthol 10 grains (or less), Cinnamon Oil 5 minims, Oil of Citronella may be added also or substituted for the Cinnamon. 10 grains of Menthol may be a little too pungent until patient gets accustomed to it. This combination used on a Yeo's respirator is not unpleasant as regards the penetrating odour of the Creosote. The inhalation has marked effect in reducing cough—a matter of the utmost importance—it rests the larynx.—Dundas Grant.—L. i./11,262.

Note.—Sir Dundas Grant now uses 3 drachms of creosote.

Ⓟ **Solutio Creosoti Composita** (was in Brompton H.)

Creosote 1, Spirit of Menthol (20%) 1, Spirit of Chloroform 1, for inhalation.

Creosote Carbonate.—*Syn.* ✱CREOSOTAL (T.M. 216421/1899). PATENT 19074/1890 ***Expired.*** U.S. X., Ph. Ned. V.

Dose.—5 to 20 minims (0·3 to 1·2 Cc.) or considerably increased.

A light-brown nearly odourless liquid. Sp. Gr. 1·165, insoluble in water, soluble in oils. **Capsules** contain 5 and 10 minims.

It contains the carbonates of guaiacol and creosol. Has been used in tuberculosis, bronchitis, and pneumonia. Breaks up in the alkaline intestinal juices.

Manufacture.—Pass a sufficiency of Carbonyl Chloride into a solution of Beech Creosote 124 in Sodium Hydroxide 40 in concentrated aqueous solution. The liquor separating is washed with weak alkali and then with water.

PNEUMONIA treated by Creosote Carbonate 15 m. every 3 or 4 hours. Guaiacol Carbonate 5 grains better where tubercle suspected.—A. Fletcher, B.M.J. i./19,799.

Drugs such as Guaiacol, Creosote, and essential oils are partly excreted by the lungs, but it is very doubtful whether the small amount so excreted can produce much effect, and the sputum is certainly not rendered less virulent when injected into animals.—Dixon, p. 239.

Creosote Valerianate.—*Syn*. EOSOTE.

Dose.—5 to 10 minims (**0·3 to 0·6 Cc.**). **Capsules** 8 minims.

An oily liquid, soluble in alcohol, glycerin and ether; checks gastric fermentation and used for phthisis epidermically. Is not so toxic or corrosive as creosote.

Proposote. *Syn.* CREOSOTE PHENYL-PROPIONATE.

Dose.—10 minims (**0·6 Cc.**).

Insoluble in water and in dilute acids, but split up in presence of alkalis. Administered shortly after meals, it passes through the stomach without causing irritation. The creosote is liberated in the intestine. Useful in tuberculosis and bronchial affections, also in intestinal bacterial infections. Capsules contain 10 minims (equivalent to 5 minims of creosote).

For Guaiacol and Compounds, see p. 445.

CUPREÆ CORTEX.

Cupreine, an alkaloid, occurs with Quinine in Cuprea Bark, *Remijia pedunculata* and other species.

It is allied to Quinine. Its salts have been similarly employed. It can be converted into Quinine by treating with Sodium in Methyl Alcohol Solution and heating the Solution with Methyl Iodide.

Several Cupreine derivatives have been used:—

Quinine (*Syn*. Methyl Cupreine) is $C_{20}H_{24}N_2O_2 = 324{\cdot}208$.
Cupreine is $C_{19}H_{22}N_2O_2 = 310{\cdot}192$.
Hydrocupreine is $C_{19}H_{24}N_2O_2 = 312{\cdot}208$.
Methyl Hydrocupreine (*Syn*. Hydroquinine) is $C_{20}H_{26}N_2O_2 = 326{\cdot}224$.
Ethyl Hydrocupreine (*Syn*. Optochin) $C_{21}H_{28}N_2O_2 = 340{\cdot}240$

Methyl-Hydrocupreine Hydrochloride. *Syn* HYDROQUININE HYDROCHLORIDE, $C_{20}H_{26}N_2O_2.HCl.2H_2O = 398{\cdot}721$. (Contains 2H atoms more than Quinine.)

Dose.—Intravenously 4 to 12 grains (**0·25—0·8 Gm.**) for adults—for malaria. For whooping cough in young children up to 6 months, ⅓ to ¾ grain (**0·02—0·05 Gm.**), 6 to 12 months, 1½ grains (**0·1 Gm.**), from 2 to 14 years, 1½ to 8 grains (**0·1 to 0·5 Gm.**) intramuscularly

When heated with strong Hydrochloric Acid it loses a Methyl group and is converted into Hydrocupreine, $C_{19}H_{24}N_2O_2$.

Soluble.—1 in 8 of water (by our experiments).

Destroys parasitic protozoa and has been advised intravenously in malaria and trypanosomiasis. It gives the usual reactions for Quinine, excepting in not reducing permanganate.—L. ii./12,1161; B.M.J. ii./13,25.

Ethyl-Hydrocupreine. *Syn.* ✱OPTOCHIN BASE (T.M. 356220). $C_{21}H_{28}N_2O_2$ 340·240

Dose.—3 to 4 grains (**0·2 to 0·25 Gm.**). Max. dose during the day 15 grains (**1 Gm.**). Not to be given on empty stomach.

A whitish amorphous powder with bitter taste. Almost insoluble in water, soluble in alcohol, ether, chloroform and dilute acids.

Uses.—In pneumonia and malaria.

The bacteria in pneumonia are destroyed by Ethyl-hydrocupreine and even the blood drawn from patients so dosed will destroy pneumococci—our only instance of specific drug therapy in acute general bacterial disease.—Prof. W. E. Dixon, B.M.J. ii./22, 410.

In treatment of pneumonia visual disturbances can be safely avoided if *Optochin Base* is administered in single doses of not more than 3 grains (0·2 Gm.) every four hours, day and night; the drug should not be administered longer than for three days, so that a total day's dose of 18 grains (1·2 Gm.), and a total dose for the whole period of 54 grains (3·6 Gm.) should not be exceeded. A regular milk diet should accompany the medication. If the slightest visual disturbance occur, Optochin should at once be stopped.

For children the dose of the base should be much less—at least a quarter or half the above figures.

Unguentum Ethyl-Hydrocupreine 1% in White Soft Paraffin must be freshly made. Efficiency decreases in 3 to 4 days. Used in pneumococcal and gonorrhœal eye affections. *Vide infra.*

The action of the compound on the pneumococcus and of ✱**Vuzin** (T.M. 412133) (Iso-octyl Hydrocupreine) on *B. diphtheriæ* is absolutely specific, and enough can be given by medicinal doses to clear the blood of these micro-organisms.—W. E. Dixon, B.M.J., i./25,814.

Ethyl-Hydrocupreine Hydrochloride. *Syn.* ✱ OPTOCHIN (T.M. 356220) HYDROCHLORIDE, Ph. Ned. V., $C_{21}H_{28}N_2O_2HCl=376{\cdot}705$.

Dose.—3 to 4 grains (0·2 to 0·25 Gm.). This dose should be given with caution. The *base* (*antea*) should be employed in pneumonia. The hydrochloride may cause grave visual disturbances.

A white crystalline powder soluble in water about 1 in 4.

Uses.—Though given internally in some cases (it has been proved effectual in treatment as a prophylactic of common colds), it is mostly used locally in solution 1 or 2% in eye affections. Its use is at first painful.

Ulcus corneæ serpens has been treated with a 1% **Ointment** (made with the base) or a 1% or 2% **Solution.** A pad of sterile wool or gauze is soaked in the solution and then left on the ulcer for 5 or 10 minutes. After this the 1% solution is *instilled* into the eye every hour or so during the day or the ointment applied 5 or 6 times per diem. *Note.*—Solutions should be freshly prepared. They decrease in efficiency after 3 or 4 days.

In conjunctivitis gonorrhoica, and photophobia accompanying eczematic conjunctivitis, scrofular ophthalmia, and keratitis has also proved useful.

Pneumococcal meningitis treated by ½ grain doses given intrathecally, together with anti-pneumo serum. One case, with Optochin alone, did not respond favourably.—C. Worster-Drought, M.P.C. June 14/22,514.

Inhibits pneumococcus in dilution 1 in 1,000,000.—G. T. Langley, L.i./24,13

CUPRUM.

Cu = 63·57.

Antidotes to Copper Salts.—Stomach-pump, emetics, white of egg and milk Hot fomentations to the stomach, barley water, morphine or laudanum to relieve pain.

Colloidal Copper —*see* **Colloidal Metals.**

Copper (Metallic) as an antiseptic for water, milk, etc., see Vol. II.

Incompatibles with Copper Salts.—Alkalis and alkaline carbonates, also preparations containing tannin and iodides

Cupri Acetas Neutralis. $(CH_3COO)_2\ Cu, H_2O = 199{\cdot}634$
Dose.—$\frac{1}{12}$ to $\frac{1}{2}$ grain (**0·005 to 0·03 Gm.**).

Dark green crystals. Applied to ulcers acts as a stimulating caustic.

Soluble 1 in 15 approximately of water; only slightly in alcohol.

In tuberculosis has been given with Sodium Phosphate 1 grain, Tragacanth Mucilage $\frac{1}{2}$ ounce, or as **Pilula Cupri Acetatis,** $\frac{1}{6}$ grain in each with Sodium Phosphate 1 grain, Liquorice Powder and Glycerin *q.s.* The fatal dose *per os* is said to be **154—184 grains, and 154** to 308 grains of the Sulphate.

Cupri Subacetas. *Syn.* **Verdigris, Aerugo.**

Is usually of indefinite composition, principally $[(C_2H_3O_2)_2Cu + CuO + 6H_2O] = 369{\cdot}284$, and only partly soluble in water. Occurs in greenish partly crystalline powder.

Linimentum Æruginis. Ph. Lond.

A decoction of verdigris, vinegar and honey, employed in veterinary work.

St. G. H. has **Gargarisma Æruginis** 1 grain in the ounce with honey and glycerin.

Cupri Citras. $C_6H_4Cu_2O_7 + 2\frac{1}{2}H_2O = 360{\cdot}212$.

Greenish powder slightly soluble in water.

Unguentum Cupri Citratis. *Syn.* **'Cuprung,'** is supplied 5, 10, 15, 20 and 25% strength for use **to ulcerations and granulations on** the eye-lids. R.O.H. has 5%. C.X. $4\frac{1}{2}$% approx.

LEPROSY.—Copper Citrate, dose $1\frac{1}{2}$ grains for an adult intravenously. It is readily made soluble in small bulk by 4 grains of Sodium Citrate.—F. J. Palmer, B.M.J., i./25,884; ii./25,96.

***Cuprentum** (T.M. 364414).

An ointment containing 5% of Copper Citrate.

Cupri Oxidum. $CuO = 79{\cdot}57$.

Is supplied commercially as 'precipitated' by adding Caustic Alkali to Cupric Sulphate solution, washing and drying, also 'granulated' by heating to partially fuse.

Cupri Sulphas. $CuSO_4, 5H_2O = 249{\cdot}714$.

Average Dose.—$\frac{1}{4}$ to $\frac{1}{2}$ grain (**0·016 to 0·03 Gm.**); as astringent $\frac{1}{4}$ to 2 grains (**0·016 to 0·12 Gm.**); as emetic 5 to 10 grains (*B.P.*'14).

Blue Crystals. *Soluble* in water 1 in $3\frac{1}{2}$, in glycerin 1 in 2 (but may crystallise out again); insoluble in alcohol.

Uses.—Given internally in very small doses for severe diarrhœa and cholera, usually combined with opium (R.F.H. Pill $\frac{1}{2}$ grain of each), and has been tried as rectal injection also for internal hæmorrhage and intestinal ulcers. ***Rapid Emetic*** for narcotic poisoning, three or four grains in water every few minutes until vomiting occurs. Also suitable for acute phosphorus poisoning.

Locally in eye affections (trachoma) as stimulant, and for gleet.

Membranous colitis in children has been treated by injection of solution of 4 grains to the ounce with a little opium added.

In dry skin affections, and in tubercular tendencies, $\frac{1}{10}$ grain doses thrice daily, appear to act like arsenic, and are better tolerated.

In pyorrhœa alveolaris the gums are 'packed' with copper sulphate, and the patient directed to swab the gum with saturated solution of tannin in Eau de Cologne; the tartar is frequently removed.—Smale and Colyer.

Erosion in chronic endometritis has been treated by scarification and bathing with 7% copper sulphate solution.

Actinomycosis and blastomycosis have been treated by internal administration and irrigation with 1% solution In syphilis, treatment with copper sulphate and potassium iodide may prove useful.

ACTINOMYCOSIS. Treated by injection of 1% Copper Sulphate Solution every few days, until softening of the infiltration occurs. For small lesions a few Cc. If extensive, the first injections are given under anæsthetic. Abscesses are opened and scraped and 40 to 100 Cc. of ¼ to ½% injected. Destruction of the fungus claimed.– B.M.J.E. ii./22,42.

TRACHOMA well treated with subconjunctival injections of a 1% solution Copper Sulphate with 4% Procain.—per Jl. A.M.A., ii./25,1923.

CANCER OF THE UTERUS.—After curetting, Copper Sulphate 10% solution used as paint, and when the ulcer becomes callous a series of injections of Colloidal Copper. Then Radium Radiation.—S. Forsdike, B.M.J., ii./25,839.

Ionisation of copper, *vide* Iontophoresis. *Bactericidal Action, e.g.*, for purifying water. *Vide Vol. II.*

Guttæ Cupri Sulphatis, R.O.H. 1 or 2 grains to the ounce. Suitable as a lotion for gleet. For styes epilate the lashes affected and use 1 in 100 lotion ten to thirty times a day. The lashes grow again.

Copper Points, contained in turned wood holders, are useful for eye and intra-uterine medication.

Copper Sulphate as a crystal or in 10% solution useful in conjunctival hypertrophy.—P. A. Harry, Pres., July, '27,244.

Alibour Water.

Copper Sulphate 2½ drachms, Zinc Sulphate 9 drachms, Camphor 1 drachm, Powdered Saffron ½ drachm, Water 40 ounces.

This formula is approximately equivalent to *Eau d'Alibour Forte* of FR. CX. Nouv. Supp., '26. *It must be diluted for use* with five or six times its volume of water, as a wet dressing in eczema.—M.P.C. i./12,8.

Ammonio-Cupri Sulphas. *Syn.* CUPRAMMONIUM SULPHATE, $CuSO_4.4NH_3.H_2O=245{\cdot}778$.

Dose.—½ to 1½ grains (**0·03 to 0·1 Gm.**), with Laudanum after meals.

Blue crystals soluble in water. Used in nervous affections. Lethal dose of this salt is stated to be equivalent to 0·05 Gm. of Copper per kilo body weight. Subcutaneous injection of strength equivalent to 0·6 to 0·7% Copper tried in mouse carcinoma with promising result.—B.M.J., ii./13,222.

Cancer of the uterus claimed to have been cured by intramuscular (intragluteal) injections of a 1% Ammoniated Copper Sulphate solution (exact formula not given). The Copper is thought to be reduced and precipitated as suboxide by the glycogen of the neoplastic cells which in consequence lose their vitality.—L. Manara, L. ii./15,1205.

Cupri Chloridum, Cupric Chloride $CuCl_2+2H_2O=170{\cdot}516$.

Dose.—¼ to 2 grains (**0·016 to 0·12 Gm.**). Use similar to Copper Sulphate. Greenish very deliquescent crystals.

Lapis Divinus. R.O.H. Cuprum Aluminatum P.G. VI.

Potassium Alum, Copper Sulphate, and Potassium Nitrate, of each 1 part are fused together. Camphor equal to $\frac{1}{50}$ of the whole previously mixed with an equal weight of Alum is added and incorporated, and the mixture run into moulds to form pointed sticks. (G.H. has less Camphor.)

P. Jap. adds Camphor 1 to 10, each of the other ingredients previously fused.

'Brass Paste.' Formed by combining Basic Copper Sulphate 86 with Basic Zinc Sulphate 14.

For cutaneous and other forms of tuberculosis, stated to be quite innocuous—application to the conjunctiva of the everted eyelid resulted in the removal of all tuberculous tissue in a case of 20 years' duration.

A fluid preparation "BRASS OIL" or "BRO" applied on gauze also used. Further PICRIC BRASS PASTE containing 1% of Picric Acid found more penetrating.—H. A Ellis, L. i./10,415.

Copper Alanine, *Syn.* **Copper Amino-propionate** $(CH_3.NH_2.CH.COO)_2$ $Cu = 239.682$. *B. typhosus* and colon organisms are less resistant than *B. tuberculosis* to Copper salts. As Copper salts have a low toxic value in man especially when given *per os*, inorganic salts of Copper might be more widely used to destroy micro-organisms. Therapeutically, Copper salts have been used in inoperable cancer. They exhibit a specially high toxicity toward protozoa and might possibly be useful in combating dysentery

Copper Alanine is soluble in blood serum—a matter of importance. It does not precipitate egg white, milk or solutions of caseinogen. *Dose* of 0·00013 Gm. produced no effect in mice. 3 Cc of 1 in 300 solution tolerated by rabbits. 2 Cc. of this strength (commencing with 1 Cc.) have been given in inoperable cancer of the breast, without local or general inconvenience.

Various low animal organisms were experimented on. *Haematococcus* which lies on the border between animal and vegetable kingdoms, lethal effect was seen in 20 minutes with solution of strength 1 in 50,000 and 1 in 100,000 Copper Alanine. *Paramœcium* was killed with 1 in 100,000 in 13 minutes. Strong effects also observed on amœbæ.—J. A. Shaw-Mackenzie, Med. Press July 19, 1916. See also Proc. Phys. Soc. Jany. 27, 1917, Jl. Physiology, Vol. LI. and B.M.J. i./20,104,174.

Copper Sodium Tartrate.

This we have prepared in the form of a blue crystalline powder containing 15·75% metallic Copper. It has the advantage of being soluble in water to the extent of about 1 in 2. Suggested for investigation in protozoal diseases.—W. H. M. Oct. 1923.

P1 **Cuprocyan.**

A double Cyanide of Copper and Potassium, soluble in water and Alcohol. Contains 22·26% Copper. Can be injected intravenously, hypodermically or intramuscularly. The compound is administered in 2% solution. Hypodermically or intramuscularly 2 Cc. every other day; intravenously beginning with 5 Cc., then 7½ Cc., and finally 10 Cc., at intervals of 7 days—intravenous injections well tolerated. Intramuscular injections may cause a general reaction. Treatment can be prolonged without inconvenience for many months, but should be suspended occasionally. Good results obtained in tuberculosis and leprosy.—Jl. Trop. Med., Dec. 1/24,316; L. ii./21,1018.

Copper salts in pulmonary tuberculosis. Improvement in some cases.—C. Riviere, B.M.J., i./26,773.

DECOCTA.

Decoctions of drugs are usually prepared 5% (unless otherwise stated) by boiling the drug in coarse powder with distilled water for 10 minutes and straining. If necessary a few drops of Chloroform or Formaldehyde will preserve fresh decoctions for a reasonable period of time. For various decocta consult index. *The strengths of decoctions of powerful substances should be specified by the physician.*

Decocta Concentrata are prepared commercially as a general rule '1 to 7.' They should contain at least 20% Alcohol—as a preservative. Fresh decoctions are preferable.

Ⓟ DIGITALIS FOLIA.

Dose.—½ to 2 grains (**0·03 to 0.12 Gm.**).

FR. CX.—*Maximum single dose* 3 grains, *maximum during* 24 hours 15 grains approx.

The dried leaves of *Digitalis purpurea* (*Scrophulariaceæ*) or foxglove, collected from plants commencing to flower.

Powdered drug (leaf of the second year) to be used *entire.*—F.I.—(*B.P.* '14) and FR. CX. adopted. Ph. Ned. V. specifies drying at 55 to 60° C.

P.G. VI. requires the leaf in coarse powder in sealed containers to have 'official prescribed activity determined by physiological assay—method and data to be supplied later.'

The Assay of Digitalis and its preparations both chemically and physiologically is fully dealt with in Vol. II. q.v.

The INTERNATIONAL CONFERENCE ON BIOLOGICAL STANDARDS (July 1923), fixed on a preparation of dried leaves as best; it contains all the active principles. In 95% of cases a total dose of 1·5 Gm. per 100 lb., during some days, produced definite therapeutic effect.—B.M.J., i./24,715.

Digitalis leaves, we found, *should be collected from plants grown in a dry, sunny situation*—preferably after a spell of dry weather. These leaves are more active, weight for weight, than the larger leaves of plants cultivated in the shade. The effect of increased sunlight in content of active principles has been noted in other drugs, *e.g.*, Belladonna.—*See* "**Digitalis Assay**" by W. H. Martindale (H. K. Lewis). For **Digitalis Seeds** *see Vol. II.*

Uses.—Digitalis is a valuable heart tonic and stimulant diuretic in pulmonary œdema and dropsy. Simultaneous purging is said to be a useful adjuvant to treatment of cardiac disease.

Digitalis has a narrowing influence upon the arteries. Acting on the vagus it pulls the reins of the heart. Acting on the heart muscle it is a most useful whip, at the same time providing it with food by improving the circulation. Slowing the heart, it makes it regular also. This slowing gives the heart an opportunity of resting, so secondarily improving contractility, conductivity and excitability. By primary action it increases its strength, regulates its rhythm by depressing excitability and conductivity. In large doses it may increase excitability causing extra-systoles, perhaps diminish contractility and by causing long pauses do harm to the circulation. All these influences vary according to dose, form in which it is given and the conditions of the heart. It may be tried with success in every case where the condition of the heart is the cause of a bad circulation or troublesome symptoms. In doubtful cases give small doses. It should be given a fair trial in every case—especially in the form of powdered leaves.—B.M.J. ii./10,1600.

The amount of the drug requisite to produce the first physiological effect is noted, and the quantity that maintains the heart in the condition best fitted to carry on the circulation efficiently. It may be that a given amount slows the pulse from 100 to 60 beats per minute, and coincident with the slowing there is improvement in patient's condition. If pushed further there may be still further slowing, but there may be untoward effects—thumping of the heart, breathlessness, etc.,—the dose is gradually reduced to a point to maintain the greatest comfort.—J. Mackenzie, B.M.J. ii./10,1606.

Referring to the previous paper H. H. Turnbull reported that giving 15 minims 4 times daily it was found that the average quantity taken before symptoms were produced was about 6 drachms, though cases varied from about 3¾ to 11¾ drachms. As to time required to produce full effect, this varies. If rapid action was desired, large doses, up to 2 drachms of Tincture *per diem*, were given and with this,sickness (sign of full dose) and beneficial cardiac effects can be produced in 36 to 48 hours. If only 1 drachm *per diem* be given, a period of 4 to 8 days is usually required to produce satisfactory result. Cardiovascular effects, heart block, extra-systoles, action of dilatation and febrile heart cases are considered. 'Full doses are necessary to produce effects of the drug and unless it is pushed no result may be obtained in cases which would at once react to large doses.' No danger in pushing the drug if type of case is taken into consideration and result watched. In most cases the nausea was the limit sign determined by patients, and the only cases likely to show bad effects are those with damaged auriculo-ventricular bundle in whom heart-block may result. 15 minims of the Tincture *t.d.* has been given to out-patients with excellent results. Raised blood pressure is no contraindication to the use of Digitalis, and is often due to some secondary effect of the heart failure.—B.M.J. ii./10,1608.

The Choice of a Diuretic.—Digitalis when given in suitable cases is a safe and efficient promoter of diuresis, but the kidneys must be capable of responding to its action which is by causing contraction of peripheral blood vessels—those of the kidney excepted—and increasing the force of the cardiac systole. It therefore raises blood pressure and forces more blood through the kidneys. In renal disease, however, the blood pressure is often raised already, and to raise it still further is to force upon diseased organs, which are already greatly overtasked, an amount of additional work, which, in their crippled state, they cannot perform. Other drugs belonging to this group are Strophanthus, Convallaria, Strychnine and Squill. Digitalis, being a cumulative drug, if continued too long without a pause, when used as a diuretic, even in moderate dose, may begin to produce signs of depression.—Eustace Smith, B.M.J. i./11,289, *et seq.*

The Effects of Digitalis.

Considerable delay occurs before Digitalis (and Colchicum) produce their effect even after absorption. It is not perhaps until several hours after introduction of the first dose that the patient is under the maximum influence. This is the reason why the treatment of pneumonia by cardiac tonics is commenced early to assist heart's action in event of it beginning to fail.—P.J. ii./11,15.

Auricular Fibrillation responded well unless pyrexia was present, or unless there were marked fibrotic changes in the heart muscle. Cases without auricular fibrillation rarely showed marked improvement. 1 to 2 drachm doses of the Tincture given daily until some definite effect obtained. Contrary to general belief, Digitalis does not raise blood pressure by constricting the peripheral vessels, and there is no risk in giving it to those suffering from degeneration of the blood-vessel walls. There is no difference between Digitalis, Squill and Strophanthus in the action on the heart, but the last two showed variation in regard to dose. Aconite had no effect upon the pulse rate.—F. W. Price, B.M.J. i./13,484, and earlier refs.

Digitalis in non-valvular heart disease. Digitalis is more certain than Strophanthus or Squills. Tinctures should be dispensed *as such* or only with alcoholic preparations.

The action of Digitalis is slow—rarely is any distinct change seen before four days. For more rapid effect Strophanthin intravenously $\frac{1}{250}$ to $\frac{1}{100}$ grain.—Cushny, B.M.J. ii./12,685 *et seq.*

Emetic Action of Digitalis. It is impossible to regard Digitalis as emetic by irritation of the gastric mucosa—vomiting caused by stimulation of the "vomiting centre" in the medulla. If clinical experience should confirm this, vomiting after Digitalis will be regarded not so much as a check to the further use of Digitalis, but as an indication that the drug has been absorbed. —L. ii./13,1014.

Withering (1775) advocated the use of Digitalis as having a power over the motion of the heart. It was to be continued 'until it either acts on the kidneys, the stomach, the pulse or the bowels.' Atropine largely fulfils the want of a remedy (absent at that time) 'to counteract the effects of Digitalis if inadvertently the doses be presented too largely, too rapidly or urged to too great a length.' Digitalis cannot influence heart-rate in presence of febrile stimulation. It has found its greatest successes in uncomplicated mitral regurgitation associated with the general evidence of cardiac failure.

Further Reports on Use of Digitalis.

James Mackenzie in the issue of 'Heart,' dated Aug. 31, 1911, recorded results in 40 cases. Of these 20 had mitral stenosis, one was described as 'mitral,' 10 as 'mitral and aortic' disease, two as 'aortic' and the rest a group containing cases of paroxysmal tachycardia, bradycardia and emphysema. Ten of the mitral stenotic cases responded well to the drug, 8 did not. Of the mitral and aortic cases only one responded; neither of the two 'aortic' cases was notably affected, while in the miscellaneous group 4 improved and 3 did not. The general conclusion was that 'cases of ***auricular fibrillation are more readily and markedly affected than cases with normal rhythm,'***—*i.e.*, the form of irregular heart usually associated with mitral disease, especially in younger subjects who have suffered from rheumatic fever, and in whom the cardiac muscle is fairly sound, respond most easily to the drug. It is thought that the diuretic effects of Digitalis may be observed without any perceptible change in the heart. The Tincture was mostly used in dose of 15 or 20 minims three or four times a day 'until some definite reaction was obtained' Aconite, long regarded as a retardant of cardiac action was quite inert in medicinal doses. Strophanthus though acting well in regulating irregular hearts was never seen to succeed when Digitalis had failed. Atropine was potent in accelerating some hearts retarded by the action of Digitalis.—L. ii./11,956; see also B.M.J. ii./11,869.

AURICULAR FIBRILLATION IN PREGNANCY.—Patient had an intolerance to Digitalis. Vomiting was caused by it, but she became more tolerant to it, and on one occasion took 11 drachms before feeling sick. On several occasions when the heart was beginning to fail it could be definitely ascertained that the amount of urine was decreasing. Under Digitalis the amount increased—sometimes to as much as 90 ounces. In this case the effect of Digitalis was to slow the pulse, improve the pulmonary condition and sometimes to promote diuresis. Digitalis was given just before the child was born—which occurred after the full effect of the drug was established.—C. H. Miller, L. ii./12,1218.

BRIGHT'S DISEASE.—In certain cases when dyspnœa is present the symptoms may be combated with Digitalis, or Ether, by stimulants, and by expectorants.—Tirard, Clin. Jl., April 5/11,401.

RHEUMATIC HEART of children treated.—G. A. Sutherland, B.M.J. ii./19, 50.

Theocin in conjunction with Digitalis—*v.* Theocin.

AORTIC INCOMPETENCE.—Digitalis is not advised. Success with Nitroglycerin. G. Evans records, however, improvement from it, with increase in urine elimination.—L. ii./16,249.

Digitalis and Atropine. Action on the peripheral circulation.—I. Harris, L. i./21,1072.

Digitalis requires ***at least 6 hours for complete absorption*** *after oral administration* and is destroyed or eliminated very slowly, so that if repeated doses are given at about six-hourly intervals it may be stopped at first sign of intoxication when there is little of it to be further absorbed and no chance of severe toxic effect. Thus the maximum benefit is obtained some days after the commencement. Digitalis was given by the ***'Rapid Method'*** with doses of 1½ drachms, 1 drachm and ½ drachm of the tincture at intervals of 6 hours. In AURICULAR FIBRILLATION with rapid ventricular rates and urgent symptoms, prompt slowing and clinical improvement resulted. Cases with normal rhythm are not suited for the method.—F. R. Fraser, L. ii./22,703.

Professor Fraser's method of producing rapid effect by oral use of digitalis was described as far back as 1875 by G. W. Balfour.—Harrington Sainsbury, L. ii./22,885.

Auricular Flutter.—By pushing treatment a flutter can be converted into fibrillation, which may be replaced by normal rhythm on discontinuing drug. Flutter may persist for years, but when ventricular rate is controlled by Digitalis little additional burden appears to be placed on the heart.—J. C. Bramwell, L. i./25,1044.

Remarkable uniformity in reaction of cases of auricular fibrillation treated with Digitalis.—A. R. Gilchrist and D. M. Lyon, Jl. Ph. & Exp. Ther., Aug., '27,319.

54 cases of auricular fibrillation treated with 0·1 Cc. of Tincture per lb. weight, with Sodium Bicarbonate, Aromatic Spirits of Ammonia, and Chloroform Water to 3 ounces. The average dose was 13 Cc., and the average pulse before use was 140 and 8 hours after was 91. Toxic effects occurred once and vomiting twice, and the average duration of good effect was 6 days, so that small doses were needed at the end of a week. The method is a measure of urgency ***only.***—G. J. Langley, B.M.J., i./27,1043, 1162.

Cardiac Failure.—Digitalis must be pushed to full legitimate limit. When it is consequent on fibrillation, digitalis gives its dramatic results. Strychnine, alcohol and camphor doubtful stimulants. There are very few specifics. A general account of the subject which will repay further study.—J. Hay, B.M.J. ii./22,899.

Overwork and Weakness.—Two minims of Tincture thrice daily for a lengthy period with intermissions, as advised in Balfour's 'Senile Heart.'—'D.M.' in M.P.C., Oct. 26, 1927.

Discovery of a new Digitalis body with true Digitalis action, capable of being eliminated from a cat within a few hours of its intravenous injection.—Jl. A.M.A. 1923,1072, per P.J. i./23,456.

Cumulative Action.—In the case of the *Tincture* this may be ignored, especially as nowadays a large initial dose is given, but more than 2 maximum doses should not be given during 24 hours.

The late Prof. Cushny held that *any Digitalis preparation which does not produce cumulative effect or nausea must either be inert or else so weak as to be valueless.*—B.M.J., i./25,412.

Irritant effect to the renal epithelium may be caused by Digitalis, as the appearance of blood and albumen in the urine of animals after large doses shows.—Cushny, L. i./17,442.

Visual Disturbance due to Digitalis intoxication following excessive dosage. Visual disorders from use of Digitalis more common than supposed.—H. B. Sprague and Co-workers, Jl. A.M.A., ii./25,719.

Antidotes.—After emetics give gallic or tannic acid, camphor, nitro-glycerin, coffee or tea, also ether or alcohol. Aconitine $\frac{1}{120}$ grain hypodermically to be repeated in $\frac{1}{2}$ hour if heart action improves. Atropine 1/200 to 1/100 grain hypodermically is advised instead, by some. Patient should lie down until recovery.

Incompatible with preparations of cinchona and with lead acetate, also with iron salts (but the blackening is preventable by citric acid) and with iodine and potassium iodide.

Ⓟ **Extractum Digitalis.** Fr. Cx. Dried leaves extracted with 70% Alcohol, evaporated to soft extract.

Ⓟ **Infusum Digitalis** (*B.P.* '14). About 1 in 143.

Dose.—2 to 4 drachms (**8 to 15 Cc.**).

This is an active preparation. In use it may well be combined with some vasodilator.

U.S. X.—Digitalis 15, Boiling Water 700; infuse one hour, filter and add Cinnamon Water 150 and Alcohol 100, finally cold Water *q.s.* to 1,000.

Ⓟ **Acetum Digitalis, Ph. Ned. IV.,** Digitalis Leaves 1, Dilute Acetic Acid (6%) 9, Alcohol (90%) 1. Macerate 5 days.

Ⓟ**Liquor Digitalis ad usum internum. Ph. Ned. V.** *Syn.* DIGISOL.

Dose.—Maximum single 3 Cc. Maximum daily 10 Cc.

Preparation.—This is similar to that of the solution for injection following, except that, after the evaporation of the Chloroform, the volume of water used to extract the residue is 88% of that of the Chloroform. Finally to every 88 parts of this solution are added 12 parts of 96% Alcohol.

Ⓟ**Liquor Digitalis ad Injectionem, Ph. Ned. V.** *Syn.* DIGISOL FOR INJECTION.

Dose.—5 Cc. maximum single and *pro die.*

Preparation.—Macerate one part of powdered Digitalis leaves with 8 parts of water during 48 hours at a temperature not exceeding 15°, strain and filter. Shake the filtrate with an equal volume of Chloroform during 48 hours, avoiding emulsification. Reserve the Chloroform solution and evaporate a measured volume of the aqueous layer on the water bath to a thick extract. To this add sufficient exsiccated Sodium Sulphate to form a dry powder. Shake this during 24 hours with a volume of the Chloroformic extract equal to that of the evaporated aqueous solution and filter. Measure the volume of the Chloroform and distil off. Treat the residue with water equal in volume to that of the Chloroform, using small quantities at a time; dissolve 0·8% of sterile Sodium Chloride in the solution and filter. Sterilise by heating on 3 consecutive days for 1 hour at 70—80° C. *Keep in a cool place away from light.*

This solution and also the Digitalis leaves are tested biologically. The fatal dose of this liquor per kilo for a cat must be 2 Cc.

Pharmacology.—

A quantity of this Dutch Liquor made with leaf grown by the writer in 1927 was examined by the usual cat method.

The lethal dose was :—

1st cat	1·7 Cc. per kgm.
2nd cat	2·1 Cc. „ „
Average	1·9 Cc. „ „

This agrees almost exactly with the figure stated in the Ph. Ned. V.

Ⓟ **Digitalone.** *Dose.*—Hypodermically 8 to 15 minims (½ to 1 Cc.). *Per os* 15 to 30 minims (1 to 2 Cc.) cautiously increased. Contains chloretone as preservative and 'anæsthetic.' Physiologically standardised.

Ⓟ **Tinctura Digitalis.** (*B.P.* '14.) 1 in 10 of 70% Alcohol=F.I., B.P. 1898 was 1 in 8 of 60% alcohol.

Dose.—5 to 15 minims (0.3 to 1 Cc.)

Frequently single doses of as much as 1½ drachms are given. Large single doses in many cases preferable to repeated small doses.

See Abstracts under Uses of Digitalis.

U.S. X. 1 in 10. The menstruum is Alcohol 4 and water 1.

FR. CX.=F.I. max. single dose, 25 minims; max. during 24 hours 90 minims approx.

In the **U.S.P. X. biological assay** the tincture, properly diluted, is injected into the ventral lymph sac of the frog, and should have a minimum systolic dose of not less than 0·0055 Cc., and not more than 0·0065 Cc., equivalent to 0·46 × 10^{-6} to 0·54 × 10^{6} Gm. of Ouabain per Gm. body weight.

In preparing the tincture, the Digitalis is first percolated with Petroleum Benzine until a few drops leave no greasy stain. The Benzine is rejected, and after exposure of the drug to the air until odour of Benzine disappears, it is percolated with the dilute Alcohol (76%)

Physiologically Standardised Digitalis Tincture. *Dose.*—5 to 15 minims, is available in commerce of strength 0·75 Cc.=Minimum Lethal Dose per 100 Gm. of frog.

Deterioration of Preparations.—Physiological Experiments which we had specially conducted for us (1913) would indicate that there is only a slight falling off in strength in 12 months. Indeed, we were able to demonstrate that a tincture ***12 Years*** old was quite up to the standard—this was confirmed by physiological test.—*cf.* L. i./13,77. *We deal with this matter more fully in Vol. II.*

An Interesting Investigation.—Some years ago, as mentioned under Tincturæ, we proved experimentally that Tinctures of various drugs of very closely equal strength can be made either by a few hours maceration or by lengthy maceration and percolation. We were more especially concerned with Alkaloidal Drugs.

Quite recently, 1927, we had comparisons made for us of the following Digitalis Tinctures :—

(A) Made by simply macerating and occasional shaking for *six hours* and then filtering off, using 1927 crop of leaf of our own growing.

(B) Made by the B.P. '14 process—the percolation taking three days—using the same leaf as in (A).

The report showed that in cats

(A) Had average M.L.D. 15·2 Cc. per kilo.
(B) „ „ „ 14·7 Cc. „ „

A Tincture made from International Standardised Digitalis under similar conditions had M.L.D. 15·96 Cc. per kilo.

(A) was therefore 104 and (B) 108% of the activity of the Standard.

The results confirm that ***short maceration is practically as efficacious as the lengthy percolation process.*** In the case of Digitalis one might have doubted that this was so.

Incidentally, a third sample, (C), examined at the same time, had 93% of the activity of the Standard. This Tincture was 2 years old.

It is the common practice to 'pass' a Tincture within 25% of Standard. The margin seems, to our mind, rather wide, in view of the proof that a first-class Tincture can be made by the simple process described.

Tartaric Acid 0·05—0·1% added to the Tincture is stated to be preservative.—Arch. Exp. & Path. Pharm. 24,102,17, per P.J., i./25,173.

Maceration for 24 hours with ½ ounce of hide powder to the pint is said to detannate the tincture.

Relative value of Tincture and fresh infusion.—In an investigation comparing Alcoholic Tinctures and water-soluble glucosides from Digitalis, E. Berry found the latter gave the most desirable therapeutic effect. Details for preparing an aqueous solution of glucosides free from Digitoxin and Saponins.—P.J. ii./15,783.

There is *no difference between amounts of saponin bodies present in tincture and infusion* of Digitalis made from equal weights of the leaf, and therapeutic doses of Digitalis do *not contain enough saponins* to induce any undesired effects.—Weiss & Hatcher, Jl. Am. Ph. Assn., 6, 1921, abst. C. D. June 24/22, 809.

Large doses of Tincture. A prescriber states he gives even ½ drachm quantities. Necessity of initialling.—P.J. ii./22,301. See also *ibid.* 322,354, also interesting note from F. Beddington, champion sculler, *ibid.* 374. The latter took 1 drachm half an hour before a race without ill effect.

In tropical climates such as that of India, Tincture of Digitalis undergoes deterioration in a short time. Tinctures become darkish in colour on dilution and are evidently considerably weaker in therapeutic efficacy.

Dosage used in India far too small. With tinctures of standard strength, doses of at least 20 to 30 minims three times a day should be given, increased for urgent cases to 45 to 60 minims, until the amount calculated by Eggleston's method is given.—R. N. Chopra, S. C. Bose and P. De, I.M.G., Mar. '25,97.

In cold countries the average quantity of Tincture of Digitalis required to cause toxic effects varies from 4 to 7 fluid drachms, but in Calcutta the smallest dose required was 9 drachms and the highest 29 drachms, while the average was well over 14 drachms. Due to loss of potency of Tincture and increased decomposition in the alimentary tract and liver. Toxic effects with B.P Tincture in 15 m. doses thrice daily very rare in India. To obtain prompt results in grave cases 2 to 3 drachms per day for 5 days should be given. The stage of optimum benefit from Digitalis usually merges into the stage of minor intoxication from cumulation of the drug.—S. C. Bose, I.M.G., Apl. '25,154.

In AORTIC DISEASE, when compensation fails, bold doses, *e.g.*, 15 minims, every four hours are given with safety.

Bronchial constriction following administration of Digitalis, relieved by Atropine.—B.M.J. i./24,715.

Flavoring.—Glyc. Coriandri, Syr. Lavandulæ; Syrupus Aurantii.

Digitalis in Cat Unit Tablets (Upsher Smith).

Each tablet is one standard Hatcher Cat Unit of Digitalis. Twenty-four tablets are stated to be adequate for complete digitalization of any case.

Ⓟ **Tinctura Digitalis Foliorum Recentum**—*Martindale.*

Dose.—5 to 15 minims **(0·3 to 1 Cc.).**

Prepared from fresh second year's leaves and chemico-physiologically standardised to normal (=M.L.D., 0·75 Cc. per 100 Gm. frog). Kobert and other authorities favour a preparation made by this method. In view of the poor keeping qualities of the leaf, unless properly stored, and the exceedingly complex composition of its active principles, the idea should be welcome.—*cf.* P.J.ii./13,437,573.

Ⓟ **Glycetract Digitalis.**—*Martindale.*

Dose.—1 to 2 minims. A potent preparation *vide* Glycetracta

Ⓟ **Pilula Digitalis Composita (Baillie's Pill).—St. G.H.**

Syn. **Guy's Pill, Addison's Pill.**

Dose.—1, as often as 3 times a day.

Mercurial Pill 2, Digitalis Leaves ½, Squill 1. In grains for one pill; in grammes for fifteen. Used in cardiac dropsy.

Ⓟ **Pilula Hydrargyri et Digitalis Composita. St. Bart.'s H.**

Mercurial Pill 1 grain, Digitalis 1 grain, Squill 1 grain, Extract of Hyoscyamus 2 grains.

[B] [P1] **Pilula Von Niemeyer.**—*Dose.*—1 pill thrice daily.

Digitalis Powder ½ grain, Ipecacuanha ¼ grain, Opium Powder grain, Extract of Helenium ½ grain.

Used in combating the fever of phthisis. When the fever is of the periodical type, with pronounced exacerbations and chills, one grain of Quinine Sulphate is added to the above formula.—*Ex* Pres.

Ⓟ **Vin de Digitale Composé.** *Syn.* Vin de l'Hotel-Dieu, Vin de Trousseau. Digitalis leaves 1, Squill 1½, Juniper Berries 15, Potassium Acetate 10, Alcohol 90% 20, White Wine 180—all by weight.

Digitalis Glucosides.

[P1] *Digitalin and all other poisonous constituents of Digitalis.*

Digitalis leaves and seeds contain several active crystalline and amorphous principles. We deal only with those actually known to be of use and which are available in commerce.

P1 **Digitoxin** (P. Helv.). $C_{28}H_{46}O_{10}$=542·368. *Dose.*—$\frac{1}{250}$ to $\frac{1}{64}$ grain (**0·00025 to 0·001 Gm.**). *Caution.*—0·002 Gm. may be a fatal dose.

Manufacture.—Grind leaves to fine powder, exhaust with water, and after drying again, extract with 50% Alcohol. Precipitate liquor with Liquor Plumbi Subacetatis, collect liquor, drive off most of the alcohol, extract residue several times with Ether, treat with water, and leave to crystallise. Recrystallise from 85% Spirit, using charcoal to decolourise.—Schmidt, p. 1640.

The content in the freshly harvested leaves is stated to be 0·25%.

This is a potent Glucoside stated to have uniform therapeutic activity. ***Soluble*** about 1 in 80 of absolute Alcohol, and soluble in Chloroform. **Sparingly soluble in Alcohol 90%; very soluble in more dilute Alcohol.**

In the pure condition it is stated to be insoluble in water. There is, however, physiological and chemical evidence that it is *soluble in the presence of the other glucosides* (*cf.*, Am. Jl. Ph., May, 1913).

Solutions may be made containing $\frac{1}{64}$ grain (**0·001 Gm.**) Digitoxin in 15 minims (**1 Cc.**) of **Petit's Liquor.** This quantity will approximate 40 drops, which may be considered a maximum dose. Suitable either *per os* or as an enema. May also be given in **Syrup,** Digitoxin 0·1, Alcohol (90%) 200, Distilled Water 750, Syrup to 2,500. *Dose.*—1 to 4 drachms (**4 to 15 Cc.**).

Ⓟ **Tablets** and Ⓟ **Granules** (Pills) of Digitoxin are prepared containing $\frac{1}{250}$ grain ($\frac{1}{4}$ milligramme).

The so-called '**Digitaline Pure Amorphe**' (Homolle), Fr. Cx. 1884, *Syn.* '**Chloroformic Digitalin,**' consists principally of a Glucoside resembling Digitoxin, and the **Digitaline Crystallisée,** Fr. Cx., consists almost entirely of it.

Caution.—When Digitalin is ordered (with the relative *bold dose*) **Digitalinum Pulv. Purum** (*postea*) should be given.

P1 ✱ **Nativelle's Crystalline Digitalin,** is probably identical with Digitoxin.

Ⓟ ✱ **Digitalin Granules, Nativelle** $\frac{1}{240}$ grain, also $\frac{1}{600}$ grain.
(✱ Nativelle is T.M. 300453)

Large doses are given to diminish the period of systole and to effect diuresis. Small doses for sedative effect, *e.g.*, in palpitation and to relieve dyspnœa associated with mitral stenosis—one Granule every three or four days. Suspend administration periodically if necessary.

Ⓟ ✱ **Nativelle's Digitalin Solution.** For intramuscular injection into the pectoral or other region free from œdema.

Dose.—1 Cc. containing $\frac{1}{240}$ grain (**0·00025 Gm.**). An oily stable solution. Ampoules are prepared.

In cases of asystole amenable to Digitalin an injection is made for four consecutive days In milder cases of hyposystole two days following, 1 Cc. being injected on each occasion. In acute cases with implication of the myocardium and threatening cardiac failure, a single injection usually suffices to restore the strength of the contraction. May be repeated once or twice. When the case is grave an injection of Caffeine Sodio-Salicylate should be given two hours before the Digitalin. In pneumonia, according to circumstances, from one to four doses.

Indications for hypodermic use—

The hypodermic method alone is admissible (1) in grave cases where cardiac failure is imminent and immediate and certain action is required, because in such cases gastro-intestinal absorption is slow and uncertain. (2) In cases in which it is desirable to safeguard the stomach and to avoid setting up gastric intolerance or embarrassment of cardiac action by a dilated stomach, the hypodermic method must be used, *e.g.*, in typhoid with failing heart, where diuresis is essential; in vomiting in arterio-sclerotics, where the stomach becomes distended on the slightest irritation.

The formula $C_{44}H_{70}O_{14}$ is assigned to Digitoxin. **Gitalin** is pharmacologically similar.—Arch. Exp. Path. Pharm. 1926,261.

Koppe took 1 mgr. of Digitoxin *per os* without any certain toxic effect, but a dose of 2 mgr., taken four days later, nearly produced a fatal result. —Prof. Cushny, B.M.J., i./25,412.

P1 Digitalinum Pulverisatum Purum.

Dose.—$\frac{1}{10}$ to $\frac{1}{2}$ grain (**0·006 to 0·03 Gm.**) three or four times daily in pill, tablets, or subcutaneously. Consists of a mixture of Digitalin (Kiliani). Amorphous Digitonin and Digitalein.—M.Am. (*cf.* Driver & Trease, P.J. i./27,624). Non-cumulative, but caution —powerful drug. It is a yellowish-white powder *Soluble* in water and alcohol, nearly insoluble in chloroform. *Well adapted for hypodermic injection.*

We repeat: When ' **Digitalin** ' *is ordered either for internal or hypodermic use this substance should be supplied.*

Ⓟ **Hypodermic Tablets** of Digitalin, $\frac{1}{10}$ grain (**0·0065 Gm.**).

Ⓟ**Sterules (Hypodermic) Digitalin** $\frac{1}{10}$ grain, also Ⓟwith **Strychnine Hydrochloride** $\frac{1}{100}$ grain as heart stimulants.

Ⓟ**Tabellæ Digitalini et Nitroglycerini.**

Digitalin $\frac{1}{10}$ grain (0·006 Gm.) with Nitroglycerin $\frac{1}{100}$ grain (0·0006 Gm.).

Useful in aortic disease. Where vascular tension is high, the addition of Nitroglycerin prevents increase of peripheral resistance, and thus robs the Digitalis of the influence on the arterioles, 'on account of which its administration is supposed to be contra-indicated.'

Ⓟ ✱ **Digalen** (T.M. 265442) (Cloetta's).

Dose.—5 to 15 minims.

A proprietary solution said to contain in each 1 Cc. (17 minims) 0·3 mgr. of an amorphous glucoside of same empirical formula as Digitoxin. For œdema of cardiac debility.

15 minims correspond to 2 grains of Digitalis Leaves or 18 minims of Tincture.—B.M.J. ii./09.1100.

Ⓟ**Hypodermic Tablets**, 1 dissolved in 15 minims, makes a solution for intramuscular use of the same strength as above.

The preparation can be given intravenously without pain and does not hæmolyse blood corpuscles.—B.M.J. i./12,60. See also W. L. Symes, L. ii./11, 1349.

It has probably increased diffusibility on account of its increased solubility —to which is due, it is said, absence of digestive disturbance when given *per os*. Pharmacol, p. 16.

Ⓟ **Digistrophan Tablets** are made, each = 0·1 Gm. Digitalis with in addition 0·05 Gm. Strophanthus.

ELIXIRS.

These are generally composed of a weak-flavoured syrup, with a fair proportion of alcohol. For list consult Index.

Elixir Aromaticum, Aromatic Elixir, U.S X.

Dose.—½ to 2 drachms (2 to 8 Cc.).

Compound Spirit of Orange, U.S. 12, Alcohol to 250. Add gradually, with constant agitation, Syrup 375, and then Distilled Water 375. Mix with the liquid Purified Talc 30, and filter until clear ; then add a mixture of Alcohol 1 and Distilled Water 3 *q.s.* to 1,000. (*Spiritus Aurantii Compositus*, U.S.—Oil of Sweet Orange Peel 40, Oil of Lemon 10, Oil of Coriander 4, Oil of Anise 1, Alcohol to 200).

The following saves time :—Mix the Compound Spirit of Orange with Talcum (Magnesium Carbonate better), add to this in a mortar gradually the water and alcohol previously mixed, transfer to a wetted filter and when all 'through' make up volume to 818 Cc., then add the sugar and shake or percolate the sugar with the filtrate.

Elixir Simplex, B.P.C., 1894 :—

Oil of Bitter Orange 30 minims, Rectified Spirit 6 ounces. Dissolve and add Distilled Cinnamon Water 7 ounces, Syrup 7 ounces. Filter through paper moistened with proof Spirit, and well sprinkled with Kaolin, returning the first portions of filtrate until it passes through bright.

Dose.—20 minims to 1 drachm. This quantity may be added to the ounce of a liquid medicine.

That of B.P.C. 1923 is about ¼ the alcohol strength of above.

N.B.—Alcohol Soluble drugs quite compatible with the original formula may be insoluble in the current one.

Elixir Aurantii Amari. *Syn.* ELIXIR OF CURACAO.

Dose.—2 to 4 drachms (8 to 15 Cc.).

Oil of Bitter Orange 4, Tincture of Bitter Orange Peel 20, Alcohol 300, Strong Orange Flower Water 20, Syrup 400, Distilled Water (*s.a.*) to 1,000. Filter through Kieselguhr.

Elixir Rhei, B.P.C.—*Syn.* LIQUOR RHEI DULCIS.

Dose.—1 to 3 drachms.

Dissolve Anethol 0·05 in Alcohol 2·5 and add to Liquid Extract of Rhubarb 25, Syrup 22·5, Glycerin 15 and Water to 100 previously mixed ; filter if necessary.

Elixir Rubrum.

Dose.—20 minims to 1 drachm (1·2 to 4 Cc.).

Solution of Carmine (*q.v.*) 1, Simple Elixir (B.P.C. 1894) 64. Gives an agreeable flavour and colour to liquid medicine, but is not compatible with acids.

Elixir Ficorum (*Martindale*).—*Syn.* SYRUPUS FICORUM.

Elixir or Syrup of Figs.

Dose.—1 to 4 drachms at bedtime or early morning.

Macerate Senna 16 ounces in cold water *q.s.* to cover twice and decant. In the first liquor heated to boiling, macerate figs cut small 32 ounces. Strain off the liquor as much as possible, and macerate the marc in the second senna liquor previously heated to boiling point. Strain off this second maceration liquor, and evaporate the two combined to 35 ounces. Dissolve in this (hot) sugar 70 ounces. Add, mixed, cinnamon oil 10 minims, oil of cloves 10 minims, chloroform 25 minims in alcohol 90% 150 minims. Make the product up to 80 ounces with water.

ENEMATA.

Substances administered *per rectum* are absorbed approximately at the same rate as when administered *per os*—exceptions are Strychnine and Quinine (slower).

Rectal Feeding.

It is said that under the most favourable conditions it is only possible to supply by means of enemata about one-quarter of the food material required to maintain nutritive equilibrium. **Protein,** even when peptonised, is so badly absorbed as to be of comparatively little value—indeed it is viewed as undesirable (see also **Nutrient Enemata** *infra*). The same is generally true of **Fat,** even when emulsified, but different individuals vary widely in their power of fat-absorption. **Sugar** is well absorbed, but allowance must be made for the destructive activity of bacteria breaking up sugar, so that some at least is lost for purposes of nutrition. The same is probably true in a less degree of proteins. **Starch** 50 Gm. *pro die* can be digested. **Water and Salts** are well absorbed. It is said that five or six ounces, gradually increasing by one ounce at a time to ten ounces, of warm water given every four hours will sustain a patient, with supplementary nourishment, for ten days to three weeks. **Alcohol** suitably diluted is well absorbed. **Stimulant Enema.** 1 to 2 ounces of Brandy with warm water *e.g.*, 1 to 3 ounces. By the most careful adjustment it is difficult to raise fat absorption above 10 Gm. in twenty-four hours or that of protein above 20 Gm. During a course of rectal feeding the bowels should be washed out once daily with an enema of tepid water before the nutrient injections are given. This cleans the bowel and washes away poisonous products of albuminous decomposition.

The injection of Nutrient Enemata should be given as slowly as possible. The best posture is with the patient on his left side, with his hips raised on a pillow. To avoid thirst not less than 2 pints of fluid should be allowed in the twenty-four hours to an average adult patient.

Of **Dextrose** (in 10% solution), 99% is absorbed. 6% is isotonic with blood and would be found more convenient and less irritating. 15 ounces or more of this Solution four times a day is well retained by an adult if the rectum is well washed out once a day with Saline Solution. The 100 Gm. or more of Dextrose thus given daily diminishes Nitrogenous waste.—N. Mutch and J. H. Ryffel.

Enema Nutriens. L. H. *Syn.* DEXTROSE NUTRIENT ENEMA.

Dose.—5 ounces every 4 hours, or if patient can retain it 10 ounces every 8 hours.

To 1½ pints of milk boiled and cooled add ½ ounce of a reliable Pancreatic Fluid or 4 Pancreatic Tablets. Maintain at body temperature 24 hours, add 1½ ounces of Pure Dextrose. Dextrose has been proved to be absorbed by the rectum, hence an important means of feeding patients who cannot take food by the mouth. The Amino-Acids separated by pancreatising the milk are also absorbed.—A. Rendle Short and H. W. Bywaters.

Glucose (St. M's H.) 1 ounce with Normal Saline 1 pint.

Enemata to act merely in the rectum and to be retained, may be given in volume of 5 ounces, but for the large intestine and lavage purposes employ one to two pints or more.

Glycerin Enemata for laxative effect rarely exceed ½ ounce.

Enema Opii is Tincture of Opium *q.s.* (*e.g.*, 5 to 20 minims) as desired by the physician, with Mucilage of Starch to 1 (or 2) ounces, mixed with gruel 5 ounces (made by the nurse).

Anæsthesia.—Ether and Olive Oil, see 'Oil—Ether Anæsthesia.'

Aperient Enemata (1 to 6 pints) are made with Soft Soap, with warm water *q.s.*, *e.g.*, **Enema Simplex, L.H., St. M's. H.,** 1 ounce to the pint, or with gruel. Marshall gives the following :—

Evacuant Enemata.

Enema of Sodium Chloride 2 to 5%. Enemata of Chamomile Infusion and other vegetable infusions; Enemata of Fixed Oils (½ to 1 pint of Olive Oil) for inflammation of rectum associated with hardened fæcal masses.

Enemata for action on rectal mucous membrane contain—

Alum 0·5%.
Asafetida 5% of Tincture in Starch Mucilage.
Boric Acid (Saturated Solution).
Bismuth Carbonate or Subnitrate 1%.
Ferric Chloride (Strong Liquor) 2%.
Infusion of Garlic and similar antispasmodic substances.
Lead Acetate 1%.
ⓅMercuric Chloride 0·01 to 0·05%.
Mucilage 25%.
Oil of Turpentine 0·5 to 1%.
P P1 Opium (or its alkaloids), a maximum dose (Ⓟ if containing less than 0·2% morphine). L.H. has Tincture 10 to 60 minims, with Starch Enema to 4 ounces, St. M's. H. 10 minims with Starch Mucilage 2 ounces.
Salicylic Acid 0·3%.
Silver Nitrate 0·1%.
Tannin 1%.

Cf. also in text, Enema Magnesii Sulphatis (et Acida), Enema Naphthalini, Enema Olei Ricini and Enema Olei Terebinthinæ.

For ulceration of rectum Silver Nitrate 10 grains to the pint, also Salol Enemata 1 to 2 drachms in Turpentine, also Ferrous Sulphate and Copper Sulphate have been used.

Enema for thirst after operation (U.C.H.): 2 pints of hot water. **K.C.H., L.H., U.C.H., C.X., R.F.H., R.N.H., E., C.H.W., St. G.H., St. M.'s H.** and **W.,** give formulæ for various Enemata.

All Enemata should be given at body temperature.

ERGOTA.

P1 '*Ergot of rye and preparations of Ergots.*'

P1 **Ergot of Rye** (*B.P.* '14).—*Syn.* SECALE CORNUTUM.

The sclerotium of the fungus *Claviceps purpurea* (*Pyrenomycetes*) on *Secale cereale* (*Graminaceæ*).

Dose.—15 to 60 grains **(1 to 4 Gm.)** in recent powder infused in boiling water. FR. CX.—*Maximum single dose* 15 grains. *Maximum during 24 hours,* 60 grains approximately.

The specific alkaloids of Ergot are Ergotoxine and Ergotamine, the total content being 0·1 to 0·2%. The crystalline Ergotinine has been proved to be inert.—Prof. A. J. Clarke, B.M.J. i./27,763, *vide postea.*

Ergotamine and Ergotoxine are the same substances from the pharmacological viewpoint, the former being a proprietary article. Whether they should be regarded as different alkaloids of Ergot, the chemist has not decided.—J. H. Burn, in reply to A. O. Bentley, P.J., i./27,565: see also *ibid.* 589,615 (Ergotoxine Ethanesulphonate), 652,681.

History and Chemistry.—Prof. J. Barger, P.J. ii./20,470.
Heat and moisture, effect of, on Ergot.—G. Tate, P.J. i./21,485.
Cultivation of Ergot.—P.J. ii./21,87.

Preservation.—Not more than 1 year old (U.S. X., assayed biologically) and to be kept whole, not powdered.—(*B.P.* '14) and F.I. *It should be kept in well closed vessels,* adding a little Chloroform or Carbon Tetrachloride to prevent attack by insects. Old Ergot is practically useless.

Antidotes.—See chapter on.

Uses.—Almost entirely for its action on the uterus, stimulating muscular contraction, and so to check bleeding after parturition, and from the presence of fibroid tumour, also to promote involution.

Ergotin causes spasm of arterioles and rise of blood pressure, by acting directly on the vessels, independently of the central nervous system. It is useful in polyuria.

Is also given to check night sweats, spermatorrhœa and menorrhagia. It has been suggested for the relief of sleeplessness, by causing cerebral anæmia by constricting the blood vessels.

All diseases in which a drug inducing muscular contraction is indicated should, according to some authorities, be treated by Ergot, *e.g.* disturbances of the circulatory system, skin affections, acne rosacea, also nervous complaints (excessive smoking).

In surgical shock 15 minims of Injection are useful.

For disordered circulation and for headache (hypodermically), alcoholism, hysteria and in acute inflammatory infections—meningitis, pneumonia, pericarditis, Ergot has also been used.

Ergot for *internal hæmorrhage* only makes matters worse by raising general blood pressure, and bleeding which has stopped may be started again by thus raising the blood pressure.—P.J. i./11,179.

In chorea it is a useful drug.

P1 **Extractum Ergotæ Liquidum.** 1=1 of Ergot. (*B.P.* '14), '100%.'—F.I.

Dose of B.P. '14 preparation.—10 to 30 minims (0·6 to 2 Cc.) or more. It is best recently prepared (not more than 6 months old).

Fr. Cx., 1=1 by wt. Maximum *dose* during 24 hours 6 Gm. Prepared by macerating with water containing 0·05% Tartaric Acid and further treatment.

The difficulty with this preparation is that it is liable to decompose whilst making in bulk. Instead of infusion and subsequent evaporation it has been suggested to repercolate without evaporation.

Samples made with 2% Hydrochloric Acid and 40% Alcohol, 40% Alcohol only, 10% Glycerin and 40% Alcohol, 2% Acetic Acid and 40% Alcohol. First found to be five times as strong as the second.—J. H. Franklin, P.J., i./27,52.

The Liquid Extract of Ergot *B.P.* '14, does not contain the specific alkaloid. At best it can only be a solution of Histamine. The crude drug will have to be assayed before it is used.—J. H. Burn, P.J., ii./26,665; i./27,133; ii./27,490.

P1 * **Ergoval** (T.M. 326360)—A preparation made with Spanish Ergot. Physiologically standardised.

Dose.—10 to 30 minims, or 1 drachm in urgent cases.

P1 **Fluidextractum Ergotœ, U.S. X.**—*Average dose* 2 Cc. is prepared by use of 2% Hydrochloric Acid in diluted Alcohol and is then assayed biologically.

In the 1914 B.P the Liquid Extract was changed from an alcoholic to a watery extract. Sir Nestor Tirard mentioned that the B.P. is controlled by International agreement whereby it is compelled to make all liquid extracts watery extracts, alcohol being added subsequently. In U.S.A. alone, in spite of this agreement, the alcoholic extract had been retained. (Acidulated Alcohol retains the Ergotoxine).—L. ii./22,1276,1277,1284.

Methods of extraction used in the pharmacopœias of U.S., France, Sweden, Germany, Switzerland, Holland, Italy, Norway, and Austria. Only the U.S. and Dutch processes give active preparations. A 50 or 60% alcoholic medium acidified with not less than 0·5% of Tartaric Acid advised.—W. H. Linnell and D. G. Randle, P.J., ii./27,423.

P1 **Normal Liquid Extract (Physiologically Standardised)** may be of such strength that 0·66 Cc. will cause a rise in blood pressure of 60 m.m. in an animal weighing 1,500 Gm. A definite amount is given to a cat and tracings are taken of the blood pressure and uterine contractions, *i.e.*, the effect desired when Ergot is given to the patient.

P1 **"Ergot Aseptic."** Concentrated and sterilised liquid extract in 1 Cc. bulbs, representing Ergot 2 Gm.

P1 **Extractum Ergotæ** (*B.P.* '14). *Syn.*—ERGOTIN (B.P. '98), EXTRACTUM HÆMOSTATICUM (F.E.).

Dose.—2 to 8 grains **(0·12 to 0·5 Gm.).**

B.P. '14 and FR. CX.—an aqueous extractive precipitated by alcohol and evaporated.

In chronic cases of hæmaturia occasionally useful.—Tirard.

P1 **Tablets and Pills,** 1, 2, and 3 grains. *Dose.*—1 to 3.

For making a hard extract for pills evaporate to dryness and add milk sugar, or powdered althea.

P1 **Capsules of Ergotin** contain 3 and 5 grains **(0·2 and 0·3 Gm.).** (*cf* also Capsules Apiol and Ergotin.)

P1 **Tablets of Ergotin, Senecin Compound** contain Ergotin ½ grain, Senecin ½ grain, Hydrastin ½ grain, Hamamelin 1 grain, Chloretone 1 grain. Useful in dysmenorrhœa and menorrhagia.

P1 **Injectio Ergotæ Hypodermica** (*B.P.* '14).

Dose.—5 to 10 minims **(0·3 to 0·6 Cc.).**

Ergot Extract 33% in Distilled Water with 1% Phenol. Should be freshly prepared.

Use.—**A dose of Ergotin, injected deeply into the gluteal muscles just before delivery, generally promotes uterine contraction.**

P1 **Sterules, Hypodermic** contain 10 minims of this injection.

P1 **Liquor Ergotæ Ammoniatus.**—1=1 of Ergot.

Dose.—**10 to 60 minims (0·6 to 4 Cc.).**

An efficient and reliable preparation, made with diluted Ammoniated Alcohol. The combination of Ammonia and Ergot is indicated in some forms of post-partum hæmorrhage, &c. In dose of ½ to 1 drachm is useful in second stage of labour when the pains are feeble, but the passages are normal.

P1 **Elixir Ergotæ cum Ferro.**—*Martindale.*

Dose.—**2 drachms, repeated if necessary.**

Dissolve Iron Pyrophosphate (U.S. VIII., *no other*) 5 grains in 1 drachm of warm water and add to Liquid Extract of Ergot 10 minims, mixed with Simple Elixir (B.P.C. 1894) 50 minims.

For anæmia and excessive (or diminished) menstruation in young women.

P1 **Tinctura Ergotæ** (B.P. 1885). TINCTURA HÆMOSTYPTICA. 1 in 4 Proof Spirit.

Dose.—5 to 30 minims **(0·3 to 2 Cc.)** or more

P1 **Tinctura Ergotæ Ammoniata.** (*B.P.* '14).

Dose.—30 to 60 minims **(2 to 4 Cc.).**

Strength 1 of Ergot in 4 of finished Tincture.

The ammoniated Tincture of Ergot found to be the most potent—far more so than the liquid or other Extract.—H. Spencer, B.M.J. ii./22,1174.

An Ammoniated Tincture found to contain more than one-third the activity of the U.S.P. fluid extract.—C.D., Jan. 15, '26, p. 71.

The only *B.P.* '14 preparation of Ergot where any quantity of the active principle is retained is the Ammoniated Tincture, which retains one quarter, other preparations lose 97%.—Prof. A. J. Clark, B.M.J., i./27,763.

P1 **Mistura Ergotæ Sedativa S.H.**

Ammoniated Tincture of Ergot 10 minims, Potassium Bromide

7½ grains, Potassium Chlorate 7½ grains, Glycerin 15 minims, Chloroform Water to 1 ounce.

𝔓1 **Mistura Ergotæ Composita.**

Dose.—½ ounce (15 Cc.).

Liquid Extract of Ergot 20 minims, Ferric Chloride Solution 10 minims, Quinine Hydrochloride 2 grains, Glycerin 1 drachm, water to ½ ounce.

Mistura Ergotæ Alkalina. St. M's.H.

Dose.—1 ounce (30 Cc.).

Ammoniated Tincture of Ergot ½ drachm, Iron and Ammonium Citrate 3 grains, Tincture of Ginger 20 minims, Chloroform Water to 1 ounce.

𝔓1 **Ergotinina,** *Ergotinine Cristallisée* $C_{35}H_{41}N_5O_6$ = 627·368, Fr Cx Supp.

Dose.—$\frac{1}{200}$ to $\frac{1}{64}$ grain (0·0003 to 0·001 Gm.).

Fr. Cx. has the latter as *max. single dose*

An alkaloid in minute yellowish crystals, insoluble in water, ***Soluble*** in Alcohol (1 in 200 of 95%, Fr. Cx.), less in Ether, very in Chloroform.

This alkaloid has been proved to be inert. Ergotoxine is the active constituent, see Absts., p. 403.

𝔓1 **Ergotininæ Citras.** $C_{35}H_{40}N_4O_6.C_3H_4.OH\ (COOH)_3$ = 804·416.

Dose.—$\frac{1}{150}$ to $\frac{1}{30}$ grain (0·0004 to 0·002 Gm.).

A soluble salt of the base, in greyish powder.

𝔓1 **Hypodermic Tablets** contain $\frac{1}{200}$ and $\frac{1}{100}$ grain.

𝔓1 **Ergotoxine.** $C_{35}H_{41}O_6N_5$ = 627·378.

Dose.—$\frac{1}{100}$ to $\frac{1}{50}$ grain. Is described as amorphous and hardly soluble in water, and strongly active physiologically (see p. 403) on the uterus—raises blood pressure, and is the principle in Ergot that produces gangrene in the cock's comb on injection. Solutions in dilute Caustic Alkali are injected. The effect of the alkaloid is enhanced by the coexistence of certain Amines, *vide infra.*

Ergotinine is stated to be the Anhydride of Ergotoxine.

𝔓1 **Cornutine** is apparently impure Ergotoxine.

𝔓1 **Hypodermic Tablets** contain Ergotoxine 1/100 grain, also 𝔅 𝔓1 with Morphine Sulphate 1/6 grain, and 𝔓1 with Strychnine Sulphate 1/20 grain. the latter being used in collapse or shock.

𝔓1 **Injectio Ergotoxinæ Hypodermica** 0·12% ($\frac{1}{100}$ grain in 8 minims).

Dose.—2 to 15 minims (0·1 to 1 Cc.).

𝔓1 **Ergotoxine Ethanesulphonate**—A new white, crystalline, stable and soluble salt. *Dose.*—$\frac{1}{100}$ to $\frac{1}{50}$ grain hypodermically.

𝔓1 * **Femergin** (T.M. 414931) **Tablets,** each containing 0·001 Gm. Ergotamine Tartrate (Sandoz), are stated to give good results.

𝔓1 * **Ernutin** (T.M. [illegible]) —Tubes of Solution physiologically standardised for hypodermic use, contain Ergotoxine, Tyramine and Ergamine (*v. infra*) In two forms (*a*) for oral.—*Dose*—30 to 60 minims to be given *per os* after labour is completed, every three hours until contraction effected, and (*b*) for hypodermic use. *Dose.*—5 to 10 minims after expulsion of the placenta.

In addition to the Alkaloid Ergotoxine, Ergot contains **Amines.**

Of the amines in Ergot two are concerned in its activity :—

(*a*) *p*-hydroxyphenylethylamine (Tyramine *vide infra*) produced by splitting off CO_2 from Tyrosine. This has an action similar to, though weaker than, Adrenine, produces contraction of the cat's uterus in the pregnant and inhibition in the non-pregnant condition.

(*b*) β-Iminazolylethylamine (*i.e.* **Histamine** $C_5H_9N_3$) produced from Histidine by splitting off CO_2. This has intense action on plain muscle. The plain

muscle fibre of the uterus in particular is stimulated to contraction by minute doses. It causes fall of blood pressure. To this the name ✱ Ergamine (T.M. 324681) has been applied.

Hypodermic Tablets of Ergamine contain 1/65th grain (0·001 Gm.).

Evidence for the toxic origin of spasmodic asthma is brought forward by A. Eustis (Amer. Journ Med. Sci., Phila., 1912, CXLIII., 862), who has not yet seen a case of asthma not due to intestinal toxæmia. In searching for the specific toxin, he investigated the Amines produced by the intestinal putrefaction of several amino-acids, formed in the normal pancreatic digestion of protein. He found that this body, β-iminoazolylethylamine, on injection into guinea-pigs and rabbits produced changes in the lungs similar to those found in asthma. He has found this base in the fæces of 3 *out of* 15 *patients*. He suggests that the asthmatic has lost the power, possessed by normal persons, of detoxicating this Amine formed by intestinal putrefaction.—Pr., 1912, p. 654.

B. Iminophilus Intestinalis isolated from human stools by means of a culture medium containing Histidine. It produces β-iminoazolylethylamine. This body was isolated by Barger and Dale from the intestinal extract.—D. M. Bertrand & A. Berthelot, L.i./13,523.

Histamine, being formed by decarboxylisation of Histidine, which is derived from proteins, it is conceivable that such substances are produced in trauma. This is an explanation of shock differing from that of the acid causation. theory (Almroth Wright's).—L. Hill, B.M.J. i./21,771.

Subcutaneously, Histamine excites a flow of gastric juice in man.—A. R. Matheson, and S.E. Ammon.—L. i./23,482.

P1 **p.-Hydroxyphenylethylamine.** *Syn.* ✱ TYRAMINE (T.M. 309250); UTERAMIN, SYSTOGEN, $OH.C_6H_4.CH_2CH_2NH_2 = 137·096$.

Dose.– 1/12 grain (**0·005 Gm.**), repeated if necessary.

An organic base which is stated to be the chief active principle of aqueous extracts of Ergot.

It contributes along with Ergotoxine to the action of Ergot, and is a constituent with the latter in **Ernutin.**

Uses.—Its action is similar to that of the suprarenal active principle, but weaker, slower, more persistent and less toxic. Given hypodermically or by the mouth it produces a marked rise of blood pressure, with increased vigour of the heart's action. Administered in shock or collapse and for producing contraction of the uterus *post partum*, but it is stated to have no value in obstetrics (see p. 408).

Guggenheim found doses of 0·02 Gm. para-oxyphenyl-ethylamine failed to have any influence on parturient women.—P.J. i./13,905.

The activity of placental extracts has been shown to be due to Tyramine. It appears to be present in Ergot to the extent of 0·01 to 0·1%. It is probably a normal product of the living fungus, like Cadaverine, which was also isolated from Ergot. *p.*-Hydroxyphenylethylamine was obtained from putrid meat. It may be made by heating tyrosine, and is readily synthesised by reducing *p.*-hydroxybenzylcyanide (*Syn.* Hydroxyphenylacetonitrile) with sodium and alcohol: $OH.C_6H_4.CH_2.CN + 4H = OH.C_6H_4.CH_2CH_2NH_2$.—Barger, Trans. Chem. Soc. 1909, vol 95, p. 1123; Engl. Pat. (1909) 314. Crystallised from xylol and distilled (B.P. 161°–163° at 2 mm.) the base forms hexagonal plates, M.pt. 161°, readily soluble in Water and in Alcohol. On methylation it yields the methiodide of the alkaloid hordenine. $OH.C_6H_4CH_2CH_2N(CH_3)_3I$.—See also Biochem. Jl. 1907,2,286; C.D. i./09,833; ii./09,229; P.J. i./09,739,761; ii./09,141; L. ii./09,1442.

p-Hydroxyphenylethylamine is also capable of preparation in other ways: (1) by nitrating benzoylphenylethylamine, reducing the resulting *p*-nitro compound to the amine, which yields the benzoyl derivative of the product required, when diazotised in boiling solution. This benzoyl derivative is then hydrolised.—Eng. Pat. (1909) 1561. (2) Another method starts from anisic **aldehyde.—Perkin and Robinson, J.C.S. 91 (1907) 1079. (3) A further method see Rosenmund, Ber. 42 (1909) 4779.—per May.**

P1 **Hypodermic Tablets of Tyramine** contain ½ grain (0·03 Gm.)

Other Ergots than that of Rye are equally or more active. Ergot of Fescue grass from New Zealand shows chemically 0·34% alkaloid—Wheat Ergot from Sweden contained 0·12%.—F. H. Carr and H. H. Dale, P.J. ii./13,130. See also H. A. D. Jowett, P.J. i./13,364.

Ergotamin of Stoll in Basle is identical with Ergotoxin. If Ergot be retained in the B.P. on account of its specific alkaloids, the method of making the B.P.'14 extracts ought to be revised to ensure the alkaloids are present in same and not thrown away. If activity due to Tyramine and other putrefactive alkaloids then Ergot ought to be removed.—H. H. Dale, B.M.J. ii./22,1172; L. ii./22,1275.

Urine normally contains *p*-hydroxyphenyl-ethylamine or a body allied to it and **Urohypertensine** (the latter probably identical with iso-amylene) both causing rise in blood pressure.—L. ii./09,367.

Tyramine has no value in obstetrics. Histamine, 2 mgr. hypodermically produces a powerful but short-lived effect and exhausts uterine activity. The specific alkaloid (Ergotamine or Ergotoxine) exerts a prolonged action ideal for use after delivery.—A. Bourne and J. H. Burn, P.J., ii./27,490.

P1 **Acidum Scleroticum.**—*Syn.* SCLEROTINIC ACID. $C_{12}H_{19}NO_9$(?) =321·16.

Dose.—$\frac{1}{2}$ to $\frac{3}{4}$ of a grain (0·03 to 0·05 Gm.) hypodermically in 10 minims of water.

An amorphous brown hygroscopic acid principle obtained from Ergot. Hæmostatic and anti-epileptic.

P1 **Hypodermic Tablets** contain $\frac{1}{16}$ grain (0·004 Gm.) Sclerotic Acid.

ERYTHROL NITRAS.

$CH_2.ONO_2-(CH.ONO_2)_2-CH_2.ONO_2=302{\cdot}08$.

Syn. ERYTHROL TETRANITRATE; NITRO-ERYTHRITE. ERYTHROTETRANITRAL.

Dose.—$\frac{1}{2}$ to 1 grain (0·03 to 0·06 Gm.), increased to 3 grains or more in tablet form *vide infra.*

In colourless and slightly tar-like smelling crystals, *soluble* in water about 1 in 20,000, about 1 in 60 of absolute alcohol; melting point, 61° C. It is formed by dissolving erythrol (a sugar obtained from various lichens, e.g., *Rocella tinctoria, R. fuciformis*, etc.), in fuming nitric acid, and precipitating by sulphuric acid; is explosive, except when in solution in chocolate.

Uses.—As a vasodilator like Nitroglycerin and Amyl Nitrite. Its slight solubility as against Nitroglycerin (1 in 800) renders action slower and more prolonged in reducing blood-pressure. Employed in angina pectoris, chronic Bright's disease, nephritis, aneurism, Raynaud's disease, dyspnœa, headache, and nervous affections.

For angina, to avert paroxysms, even half a drachm a day has been taken.

Tabellæ Erythrol Nitratis.—*Martindale.* *Dose.*—1 or 2.

Contain $\frac{1}{2}$ grain (0·03 Gm.), combined with chocolate. **Tabellæ** $\frac{1}{8}$, $\frac{1}{4}$ and 1 grain (0·008, 0·016 and 0·06 Gm.) are also prepared.

Præcordial pains are promptly relieved by a tablet three times a day.

Daily use of the tablets, beginning with $\frac{1}{2}$ grain thrice daily and gradually increasing, will ward off attacks.

Intermittent closing of cerebral arteries. Various questions to consider as to treatment: Spirit of Nitrous Ether controls the irritable tonicity of the vessel walls; where symptoms are urgent Erythrol Nitrate $\frac{1}{4}$ to $\frac{1}{2}$ grain repeated every 3, 4, or 6 hours, as required, is advised.—W. Russell, B.M.J. ii./09,1110.

Melancholia, in which affection the blood pressure is often found abnormally high, is frequently relieved by lowering it. Start with ½ grain tablets twice daily and slowly increase the dose to two or three grains daily.—Robertson, B.M.J. i./11 ,800.

In arteriosclerosis Erythrol Tetranitrate useful.—M.A. 1911.

In aortic disease for relief of serious pain Amyl Nitrite and Nitroglycerin are employed (*q.v.*). Erythrol Tetranitrate produces little effect until half an hour after its administration, and the maximum effect is produced at the end of an hour; the arterial tension gradually increases again, but it does not return to its previous condition until about ten hours after the dose has been taken.—Tirard.

Asthma, very effective during the paroxysm, especially if followed by some hot drink, *e.g.*, Bovril: relief lasts at least 24 hours.-W. W. W.

In lead colic Erythrol Nitrate is an excellent sedative, as it relaxes the painful spasms of the intestinal coats.

Mannitol Nitrate, $CH_2.ONO_2.(CH.ONO_2)_4CH_2.ONO_2=452\cdot112$.
Syn. HEXANITRIN. NITROMANNITE.

Dose.—1 grain (**0·06 Gm.**), increased.

The nitrate of the hexahydric alcohol mannite, $C_6H_8.(OH)_6 = 182\cdot112$.

In light acicular crystals, M.pt. 113° C.; is less soluble in water but more explosive than erythrol nitrate, and if long kept is liable to decomposition. Requires extra care. Is used similarly to erythrol nitrate, and is not so costly. In angina and asthma its action is not so powerful, but probably more prolonged.

Tabellæ Mannitol Nitratis.—*Martindale.*

Contain 1 grain (**0·06 Gm.**) in chocolate basis.

Prof. Silvan (Clinique de Bologne, Italy) reported that in cases in which a 'hypotensive' condition represents the predominant symptom, or at least the most apparent cause of many of the morbid points complained of by patients, this substance, with which one can successfully diminish and maintain for a considerable time a reduced pressure, has given satisfactory and comforting results.

ERYTHROPHLŒUM.

Casca Bark.—*Syn.* SASSY BARK; ORDEAL BARK. The bark of *Erythrophlæum Guineense* (*Leguminosæ*).

Tinctura Erythrophlœi.

1 in 10 Alcohol (90%). *Dose.*—5 to 10 minims (**0·3 to 0·6 Cc.**).

P1 Erythrophlœinæ Sulphas. *Dose.*—$\frac{1}{40}$ to $\frac{1}{24}$ grain (**0·0015 to 0·0025 Gm.**) in pill.

In yellowish white granular crystals, soluble in about its own weight of water. Has the combined action of Digitalin and Picrotoxin, and is a local anæsthetic for eye-work in 0·05 to 0·25% solution.

The proportion of Erythrophleine in the drug is exceedingly small. An examination of the commercial salt indicated the approx. formula to be $C_{28}H_{43}O_7N.HCl$.—Am. Jl. Ph., Aug. 1912.

Examination of the bark and isolation of alkaloid. Reference to Laborde's work on *E. Couminga*, in which 0·4% was stated to be found. By the Keller process about 0·10% of pure alkaloid was extracted from *E. Guineense* in the

form of a very pale yellow varnish from which unsuccessful attempts were made to prepare a crystalline salt.—C. W. Maplethorpe, P.J. ii./23.85.

Antidote.—A prompt emetic or use of stomach pump, with subsequent stimulants.

Dental Use.—An almost ideal drug for the treatment of sensibility of dentine. It is a true obtundent only where locally applied, and has no central direct effect on the pulp. The sensibility in a cavity filled with the alkaloid was in 24 hours absolutely abolished

Ⓟ **'Throphleol,'** a solution (50%) of **Erythrophleine Sulphate** in **Eugenol**, is most conveniently used.

After thorough dehydration of the cavity a small piece of cotton or bibulous paper saturated with the solution is sealed with a temporary gutta percha filling, placing as much as possible in actual contact with the dentine, and left *in situ* for 24 or 48 hours, not longer, or slight inflammatory symptoms in pulp or peri-cementum supervene. With this exception, it has no injurious effects even for young children. Death of the pulp has not been observed after use. Pain and peri-cementitis 2 or 3 days after filling have, however, been reported.—Dental Annual and Directory, 1904, *p.* 223.

Excavation of the approximal cavity in a first molar was painless but that of the occlusal cavity in the same case was painful —Dental Surgeon, April 15, 1905.

EUONYMI CORTEX

The Root Bark (*B.P.* '14) obtained from ***Euonymus atropurpureus*** (*Celastraceæ*), the wahoo or spindle-tree.

Euonymus Atropurpureus should be carefully distinguished from spurious barks. It should show externally longitudinally striated cork and a tangentially striatified liber and delicate threads when gently broken transversely, also medullary rays consisting of a single row of cells.—E. M. Holmes, P.J. i./18,88.

Uses.—Possesses tonic, hydragogue, cathartic, diuretic, and anti-periodic properties

Extract of Euonymus (*B.P.* '14). *Syn.* EUNOYMIN.

Dose.—1 to 2 grains (**0·06 to 0·12 Gm.**). **Tablets,** $\frac{1}{6}$, $\frac{1}{2}$ grain. $\frac{1}{4}$ to 1 grain cholagogue, 1 to 4 grains cathartic.

A brown alcoholic extractive containing calcium phosphate to keep it as powder. In commerce chlorophyll is sometimes added. FR. CX. has EVONYMINE BRUNE, *max. single dose* $1\frac{1}{2}$ grains.

Pilula Euonymin.

Euonymin 2 grains, Extract of Henbane $\frac{1}{2}$ grain, for one pill; taken at bedtime. A cholagogue stimulant, producing no depression or headache : requires to be followed by a saline aperient in the morning.

One grain, combined with 4 grains of Iridin, is a successful purge.

Extractum Euonymi Liquidum.

1=1 made with Alcohol (90%) 4, Water 1. *Dose.*—10 to 60 minims (**0·6 to 4 Cc.**).

Tinctura Euonymi. *Dose.*—10 to 40 minims (**0·6 to 2·5 Cc.**). Strength 1 in 5 of Alcohol 45%.

Liquor Euonymini et Cascara. B.P.C. *Dose.*—$\frac{1}{2}$ to 1 drachm.

Liquor Euonymini et Iridini. B.P.C. *Dose.*—$\frac{1}{2}$ to 1 drachm.

Rub Dry Euonymus Extract 3·66 and Iridin 1·83 with Alcohol 45% 50. Filter and add Potassium Carbonate 1·37 in water 25, and make up with Alcohol 45% to 100. Purgative and presumed cholagogue.

Liquor Euonymini et Pepsini (Glasg. Form.).

Dose.—½ to 1 drachm (**2 to 4 Cc.**).

Euonymin 155 grains, Pepsin Soluble (Scale) 310 grains, Dilute Hydrochloric Acid 340 minims, Alcohol (45%), 6 ounces, Chloroform Water to 20 ounces.

FEL BOVINUM PURIFICATUM.

Purified Ox Bile (*B.P.* '14).

Dose.—5 to 15 grains (**0·3 to 1·0 Gm.**). Stipule No. 1 for 5 grains.

A dark greenish brown bitter-sweet mass.

Soluble in water and alcohol 90%, insoluble in ether.

Manufactured by evaporating 20 of fresh ox bile to 5, mixing with 10 of alcohol 90%, separating the precipitate and evaporating the clear fluid to thick extract consistence. It is composed of bile salts, cholesterin, lecithin and bile pigments. It is best given in salol-coated pills or '**Stearettes**' containing 5 grains. **Capsules** contain 5 grains each.

Uses.—An emulsifier of fat and a stimulant to the action of the liver. Has been given in jaundice and typhoid. A small quantity diluted with water may be used as an enema in obstinate constipation. Pig's gall has also been used. The bile of venomous snakes is said to act as antidote to their poison.

Fel Bovinum Exsiccatum.—*Dose.*—5 to 10 grains in cachets.

Dysentery has been treated with satisfactory results by rectal injection of 1½—2 ounces of fresh bile of sheep.

In rheumatoid arthritis where *B. Coli* infection is derived from a chronic colitis, ox gall in 10 to 15 grain doses several times daily is one of the most efficient remedies —B.M.J ii./10,305.

Extractum Fellis Bovis U.S.X. is made by alcohol extraction and making up to weight with starch so that 1 of extract equals 8 of ox gall.

FERRUM.

Fe=55·84.

Ferrum Redactum. *Syn.* QUEVENNE'S IRON.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

Fine powdered iron containing at least 80% (U.S. 90%) metallic iron, prepared by reducing ferric hydroxide with hydrogen.

Incompatible with tannin and metallic salts.

As the human body contains only about 39 grains of iron, to give large quantities, *e.g.*, 6 to 10 grains *per diem* is futile.—H.

Pills of Reduced Iron require ⅛ to ⅓ grain Compound Tragacanth Powder to bind them. **Trochisci Ferri Redacti** contain 1 grain.

Ferri Carbonas Saccharatus (*B.P.* '14).

Dose.—10 to 30 grains (**0·6 to 2 Gm.**).

Ferrous oxycarbonate, $x\text{FeCO}_3\ y\text{Fe(OH)}_2$, partially oxidized and mixed with glucose (sugar in '98 B.P.), the mixture containing not less than 50% (B.P. '98 33%) of its weight of ferrous salt if reckoned as carbonate $FeCO_3 = 115·84$. P. Ital. IV. requires 9·5 to 10·5% Fe.

Incompatible with tannin-containing drugs, also with acids and acid salts.

Ferri Carbonas Saccharatus Concentratus.

Four times as strong as the U.S. preparation, *i.e.*, containing about 60% of Ferrous Carbonate. Can be made by U.S. VIII. method, but adding 5% Glucose at end of the process instead of the 80% of Cane Sugar. Is useful for capsule and pill making.—P.J. ii./05,134.

Uses.—For anæmia and chlorosis of young women. The dose may be increased up to 10 grains daily of Anhydrous Ferrous Carbonate.

Capsules and Tablets of Saccharated Iron Carbonate, contain 5 grains (0·3 Gm.).

Pilula Ferri (*B.P.* '14). *Syn.* Blaud's Pill.

Dose.—5 to 15 grains (0·3 to 1 Gm.).

Each 5 grains contain about 1 grain of Ferrous Carbonate.

When palpitation occurs in connection with anæmia or chlorosis, the frequent employment of iron pills or of powders of reduced iron will probably remove the cause and so allay the symptoms.—Tirard.

For the original Formula for Blaud's Pill, the Estimation of, and Effects on the Blood, see Vol. II.

Capsules of Blaud Pill equal to 5 grains of the pill are made.

Tablets, 4 and 8 grains. *Dose.*—1 to 4 four-grain, or 2 eight-grain Tablets, also made ℙ1 4 gr. with Arsenious Acid $\frac{1}{64}$ gr. *Dose.*—1 to 4.

Capsules are also made in the following combinations :—

Blaud Pill 5 grains with Aloes, ½, or 1 grain.
ℙ1 „ „ 5 grains with Arsenic $\frac{1}{100}$, $\frac{1}{50}$, $\frac{1}{30}$ grain.
„ „ 5 grains with Cascara Extract, 3 grains.
„ „ 5 grains with Cod Liver Oil, ½ dr.
ℙ1 „ „ 5 grains with Nux Vomica Extract, ¼ grain.
„ „ 5 grains with Quinine Sulphate, 1 grain.

Ferri Citras. *Average dose.*—4 grains (0·25 Gm.).

Contains ferric citrate corresponding to not less than 16% metallic iron. Garnet red soluble scales with slight ferruginous taste.

Ferri et Ammoni Citras (*B.P.* '14). U.S. X.

Dose.—5 to 10 grains (0·3 to 0·6 Gm.). Yields 31% or 32% ferric oxide (*B.P.* '14). Contains 16 to 18% metallic iron (U.S.). Dark red scales soluble in about half their weight of water.

The amounts used in the *B.P.* '14 for making this correspond to the formula $(NH_4)_3 2FeC_6H_5O_7$. The alkali (Hydrate Carbonate or Bicarbonate can be used) should be added before the Iron is "nearly dissolved"—the solution of the latter being hot, not cold.—R. C. Cowley, C.D. i./11,315.

In ordinary cases of debility and anæmia. Especially preferred in lingering cases of gastric catarrh after alkalis have ceased to benefit and the stomach is not ready for an acid tonic. Also with Sodium Salicylate in subacute rheumatism of children.

Ferri et Ammonii Citras Viridis.

Dose.—5 to 10 grains (0·3 to 0·6 Gm.).

Hypodermically ½ grain in solution, but *for this purpose it must be neutralised.*

Sterules ½ (0·03 Gm.) and 1 grain (0·06 Gm.) and 2 grains

(0·12 Gm.) in 1 Cc., also with Strychnine Hydrochloride $\frac{1}{60}$ grain (0·001 Gm.).

Ferri Hydroxidum cum Magnesii Oxido, *see* Antidotum Arsenici.

Ferri Perchloridum. *Syn.* FERRI SESQUICHLORIDUM, FERRUM SESQUICHLORATUM. $Fe_2Cl_6,12H_2O=540·614$.

Dose.—2 to 8 grains (0·12 to 0·5 Gm.).

Deliquescent yellow masses made by evaporating the stronger official solution and crystallizing.

Incompatible with infusions, &c., containing tannin, with the alkalis, alkaline carbonates, iodides, salicylates and mucilage of acacia. Ferric Chloride with Potassium Iodide in presence of Potassium Citrate produces a Potassium Ferricitrate and hence is compatible.

Uses.—A well-known tonic in ANÆMIA and RICKETS, has astringent action and is a useful styptic (it may be used in the solid form).

ERYSIPELAS.—Large doses of Iron Perchloride Tincture probably aid phagocytosis.—Whitla, Pract. Med. See also p. 414.

The Perchloride is the most diuretic preparation of Iron.—H.

Iron decreases the elimination of uric acid, which may account for the production of headache in rheumatic patients under its influence.—H. Its administration may bring on an attack of gout.—W.W.W.

GASTRIC ULCER.—Whether deep or superficial, with or without hæmorrhage, the stomach should be emptied by a soft sound. By means of a funnel, 100 Cc. of a solution of Ferric Chloride 1 in 1,000 are introduced. This is removed, and the operation repeated till the liquid comes out clear, *i.e.*, usually after about five washings with the solution. 500 or 600 Cc. will usually control even the most severe hæmorrhage, and this is repeated for 4 or 5 days. —Pr. Nov. '08,679.

T. H. orders for **Nebula Ferri Perchloridi,** 5 grains and Glycerin 15 minims; for **Pigmentum Ferri Perchloridi** 60 grains to 120 grains of this salt to each ounce of solution.

Glycerinum Ferri Perchloridi, G.H., has Ferric Chloride 1, Glycerin to 5. For use as a paint. Glycerin and Chloroform Water cover its metallic astringent taste.

Loëffler's Pigment for Diphtheria.

Menthol 10, Toluol *q.s.* to 36, Ferric Chloride Solution 4, Absolute Alcohol to 100. To apply on wadding every 3 hours. Painful in use. Dilute Hydrogen Peroxide is preferable.

Diphtheritic throats swabbed with Antitoxin (the patients receiving also injections simultaneously) compared with those swabbed with Loeffler's Solution and other antiseptics showed that those treated with Antitoxin took almost 24 hours longer to clear—which might be expected, as Diphtheria Antitoxin is not bactericidal.—B.M.J. ii./11,163.

'Collapsubes' with rectal tube contain Ferric Chloride 1 in 40 with soft paraffin basis for piles.

Gossypium Stypticum. *Syn.* GOSSYPIUM FERRI PERCHLORIDI. Saturate Absorbent Wool 85, with Water 100 containing Ferric Chloride 15 and dry. **Linteum Stypticum** is made similarly.

(In **Ph. Ned. IV.,** Gossypium Stypticum contained at least 2% Quinine Hydrochloride, and no iron.)

Liquor Ferri Perchloridi Fortis (*B.P.* '14). Contains 20% Fe. Has Sp. Gr. about 1·49. Its yield of Fe_2O_3 is 1·42 Gm. from 5 Cc.

Liquor Ferri Chloridi. U.S. X. Contains 10 to 11 Gm. Fe in 100 Gm.

Average dose.—1½ minims (0·1 Cc.).

Liquor Ferri Perchloridi (*B.P.* '14).

Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

Contains about 5% Fe. Strong Solution of Ferric Chloride 1 Water to 4.

Sp. Gr. and Fe. content do not agree.—Y.B.P. '24,754.

In SEPTICÆMIA—in the first 24 hours 4 drachms of the official liquor divided in 12 doses; for the second 24 hours 6 drachms; for the third 1 ounce. All cases were successful.—L. ii./04,1248.

RINGWORM treated by first cleaning the scalp with Petrol and apply Strong Ferric Chloride Solution. *Do not wash the head* during the treatment. The patches affected should be treated every second day for three times, afterwards every third day for six times, to generally effect cure. Dab the rest of the scalp occasionally as prophylactic. The iron-stained scurf and epidermis, will in the course of some days, come away from the scalp, leaving a healthy skin beneath.—J. H. Garrett, B.M.J. i./13,390.

Liquor Ferri Sesquichlorati (Ferric Chloride Solution), P.G. VI. Contains 10% Iron approx. As in U.S., there is only one strength of this solution.

Tinctura Ferri Perchloridi (*B.P.* '14).

Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

A 25% dilution of strong solution of Ferric Chloride with water containing a proportion of Alcohol (14·5 Gm. Anhydrous Ferric Chloride in 100 Cc. approx. U.S. **about** 13%).

Flavoring.—Syl Aurantii Floris (double dose); Syrupus.

Owing to the fact that ferric chloride does not remove any of the acid of the gastric juice (as when reduced Iron or Blaud's Pills are given), this is preferred by many.

Thread worms are killed by rectal injection of a drachm of the tincture in 10 ounces of water.

Angio-neurotic œdema has been treated with drachm doses repeated if necessary every 20 minutes.

Strumous children with tuberculous bone disease or enlarged glands have been treated with 5 to 10 minims, with 10 to 20 minims of solution of mercuric chloride *t.d.s.* given over long periods.

Cutaneous erysipelas. An old effective remedy is local application of strong Solution of Ferric Chloride, also internal use of Tincture of Ferric Chloride.—E. T. Larkam, B.M.J. i./21,36.

For further uses see Ferri Perchloridum, antea.

Mistura Ferri Aperiens. U.C.H.

Magnesium sulphate 30 grains, ferrous sulphate 2 grains, diluted sulphuric acid 2 minims, peppermint water to 1 ounce. For the cure of inebriety.

P1 Mistura Ferri Arsenicalis. U.C.H.

Citrate of iron and ammonium 8 grains, arsenical solution 3 minims, infusion of calumba to 1 ounce. *Dose*—½ to 1 ounce.

Mistura Ferri Salina. U.C.H.

Potassium citrate 22 grains, solution of ferric chloride 24 minims, chloroform water to 1 ounce. The styptic taste of iron is masked in this mixture, as a double decomposition occurs between the iron and the potash salt.

Liquor Ferri Dialysatus (B.P. 1885).—Sp. Gr. 1·047.

Dose—10 to 30 minims (**0.6 to 2 Cc**).

Better tolerated than the strong acid preparations. Contains about 5% Ferric Oxide. To be prescribed as "drops," undiluted, or mixed with glycerin.

Glycerinum Ferri Dialysati.

Dialysed Iron Solution 1, Glycerin 2. Keeps well and is palatable.
Dose.—1 drachm (**4 Cc.**).

Dialysed iron is useful as an antidote to arsenic—much superior to the moist peroxide; 1 ounce doses should be given repeatedly, preceded by a dose of common salt or sodium bicarbonate

Ferrum Oxydatum Saccharatum, P. Austr., P.G.VI., **Saccharated Ferric Oxide.** *Dose.*—10 to 40 grains (**0·6 to 2·5 Gm.**).

Dilute Ferric Chloride Solution (P.G.) 30 (by weight) with Water 150. Then add with stirring a solution of Sodium Carbonate 26 in Water 150 (towards the end of the precipitation before each fresh addition of the alkali one waits for the re-solution of the precipitate). Wash to free from Chloride, collect on cloth, press slightly, mix in porcelain dish with powdered Sugar 50 and so much Sodium Hydrate Solution (Sp. Gr. 1·17) as is required to dissolve on a water bath (not more than 5 to be used), evaporate and dry and mix with Sugar *q.s* to make 100.

Liquor Ferri Oxydati Saccharati. *Dose.*—½ ounce

Under this name a solution is made containing about 5% of the above, flavoured with Cinnamon or Vanilla.

Liquor Ferri Pernitratis (B.P. 1898).

Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

A reddish brown solution containing ferric nitrate $Fe_2\ (NO_3)_6 = 483{\cdot}912$ Sp. Gr. 1·107, contains 3·3% Fe. *Uses* similar to those of the solution of the perchloride. For children in convalescence from prolonged chronic diarrhœa, 1 to 2 minim doses are useful.

Vinum Ferri, U.S. VIII. *Average dose.*—2 drachms (**8 Cc.**).

Iron and Ammonium Citrate 4, Tincture of Sweet Orange Peel 6, Syrup 10, White Wine to 100.

Vinum Ferri Amarum, U.S. VIII. *Average dose.*—2 drachms (**8 Cc.**).

Soluble Iron and Quinine Citrate 5, Tincture of Sweet Orange Peel 6, Syrup 30, White Wine to 100.

ORGANIC IRON COMPOUNDS.

The hæmoglobin content of the blood is thought to increase by the use of some of these compounds.

Triferrin. *Syn.*—Ferri Nucleinas, Ferrinol.

Dose.—15 grains *per diem* after meals in divided doses.

An insoluble powder said to contain 21% of Iron and nearly 3% of Phosphorus. In anæmia and in phthisis.

Liquor Ferri Albuminati (after Dieterich. *Liquids to be weighed*). Was in P. Jap. 1907 slightly modified.

Dose.—1 to 4 drachms (**4 to 15 Cc.**).

P.G.V. directs: Mix fresh Egg Albumen 75, rubbed through a sieve with water 2,000 at 50° C. and add to Dialysed Iron Oxychloride Solution 50 in water 2,000 at 50° C. in a fine stream. If necessary, hasten precipitation by adding Salt 4 in Water 100. Wash thoroughly with lukewarm water and test with Nitric Acid *s.a.* Dissolve ppt. in Sodium Hydrate 15% *w/w* 3, add to the clear liquid Aromatic Tincture 2, Cinnamon Water 100, Alcohol 150, and Water *q.s.* to 1,000. Is easily digested and borne by a delicate stomach. **If Solution of Ferric Chloride be used in place of the Oxychloride a clear preparation is produced.**

P.G. VI. now adjusts by analysis during process of making, so that the ultimate preparation contains 0·39 to 0·4% of iron. Ph. Ned. V. contains 0·25% Fe_2O_3.

Liquor Ferri Peptonati (after Dieterich; *Liquids to be weighed*).

Dose.—1 to 4 drachms (**4 to 15 Cc.**).

Dissolve dried egg albumen 10 in distilled water 1,000; add to this pepsin 0·5 and hydrochloric acid 14. Digest the mixture for 12 hours at 40° C. (104° F.)

cool and neutralize with solution of soda; then add solution of chloroxide of iron 120 diluted with distilled water 1,000. Again neutralize exactly with diluted soda solution, collect, and wash, precipitate free from chloride.

Transfer to a tared bottle and dissolve in hydrochloric acid 1·17, warming slightly, add simple syrup 10, compound tincture of cinnamon 10, alcohol (90%) 150, and distilled water to 1,000. This solution is clear by transmitted light but opaque by reflected light.

Ferrum Peptonatum in scale form can be produced by digesting egg albumen with pepsin and dilute hydrochloric acid at 39° C. The peptone solution is neutralised and added to solution of chloroxide of iron. The precipitated peptonate is dissolved in water with a little hydrochloric acid—the solution is evaporated and 'scaled' in the customary manner.

Liquor Ferri Peptonati cum Quinina.

Dose.—1 to 4 drachms **(4 to 15 Cc.)**

Contains ½% of Quinine Hydrochloride.

Elixir Ferro-Manganesii Peptonati.

Dose.—1 to 4 drachms **(4 to 15 Cc.).**

Contains, in addition to Iron, 0·1% of Manganese.

A useful and palatable hæmatinic.

Liquor Ferro-Manganesii Peptonati cum Hæmoglobin (5 grains in the drachm)—suspended, will not dissolve to this extent.

Also **Liquor Iodo-Ferro-Manganesii Peptonati** [0·1% Iodine in combination ($\frac{1}{16}$ grain per drachm)]. In anæmia and chlorosis.

Extractum Ferri Pomatum is prepared by digesting Iron Filings in juice of sour apples. That of P.G.VI. contains 5% Iron.

Tinctura Ferri Pomata, P.G.VI.

Dose.—15 to 30 minims **(1 to 2 Cc.).**

Ferrated Extract of Apples 1 part, Cinnamon Water (P.G., containing 10% of alcohol) 9 parts.

Liquor Ferri Acetatis (B.P. 1898).

Dose.—5 to 15 minims **(0·3 to 1 Cc.).**

This solution does not decompose iodides. Pneumonia has been treated with full doses every six hours until crisis past.

Liquor Ferri et Ammonii Acetatis, U.S. BASHAM'S MIXTURE.

Average dose.—4 drachms **(15 Cc.).**

Tincture of Ferric Chloride 4, Dilute Acetic Acid 6, Solution of Ammonium Acetate 50, Aromatic Elixir 12, Glycerin 12, Water to 100. To be freshly made. Particularly useful in anæmia and chronic parenchymatous nephritis. It acts as a good diuretic and diaphoretic.—H.

Ferri Iodidum. $Fe\,I_2 = 309·704$

Dose.—1 to 5 grains **(0·06 to 0·3 Gm.).**

Crystalline brown hygroscopic masses readily soluble in water.

Manufacture.—It is best to employ a wet process, *e.g.*, to combine Iron 6 and Iodine 17 in water *q.s.*, filter and evaporate to dryness. By this method the iron is kept in excess.

Clean Iron Filings, previously washed with acid if oxidised, are preferable to iron wire. Mostly prescribed as one of the following:—

Syrupus Ferri Iodidi (*B.P.* '14).

Dose.—½ to 1 drachm **(2 to 4 Cc.).**

Contains Anhydrous Ferrous Iodide 5% w/w approx. 10 Cc. contain 0·7 Gm. FeI_2. It contains 10% of Glucose. F. I. also requires same content of FeI_2. Ph. Ned. V. agrees.

For suggestions re making and preservation of the Syrup, see Vol. II.

Incompatible with Sal Volatile and with Easton's Syrup—strychnine iodide, and perhaps quinine iodide are thrown out.

Capsules are prepared equivalent to 10 and to 30 minims.

Rheumatoid arthritis well treated.—H. W.

Exophthalmic goitre and rheumatoid arthritis have been treated with this and Arsenic, frequently with Guaiacum in addition.

The Syrup is liable to produce severe headaches.—K. Fraser, Cumberland, School M.O. Report, 1925.

When bronchitic cough is bad enough to waken child in the early morning, give 5 to 30 drops Syrup of Iodide of Iron in 1/3 to 1/2 glass of water, thrice daily just after meals, in warm weather. During the winter, these children, especially if under weight, are given instead the Pyrophosphate of Iron, ½ to 1 grain, in ¼ to 1 teaspoonful of Cod Liver Oil.—M. Osthermer, Atlant. Med. Jl., per Jl. A.M.A., ii./25,635.

Dispensing Note.—Syrup of Iodide of Iron with Easton's Syrup mixed together precipitate in time, whether as such or diluted, but if both be made with glycerin they are compatible as such, but precipitate on dilution. But if a trace of hypophosphorous acid be added to the ordinary Syrup of Iodide of Iron they do not cause precipitation.

Liquor Ferri Iodidi. *Dose.*—4 to 8 minims (0·25 to 0·5 Cc.).

A solution for diluting 1 to 7 with Syrup to produce the above.

Suggested formula containing Hypophosphorous Acid (30%) 140 Cc. and Glycerin 100 Cc. per litre as preservatives.–G. M. Beringer.

Ferri Iodidum Saccharatum. U.S. 1890.

Dose.—2 to 15 grains (0·12 to 1 Gm.).

Combine Iron Wire 6, Iodine 17, in Water 20: when complete, filter on to milk sugar 40, and Reduced Iron 1, previously mixed. Evaporate to dryness and add milk sugar, *q.s.* to 100. This and a similar preparation of P. Jap. IV. contain about 20% FeI_2.

Uses.—An exceedingly useful tonic, especially in arthritis, anæmia and phthisis. May be ordered in form of cachet.

Pilula Ferri Iodidi (B.P., 1885).

Dose.—3 to 8 grains (0·2 to 0·5 Gm.).

Shake carefully in a stoppered bottle Iodine 80, Water 46, with Iron Wire 40; add decanted Solution to Sugar 70; mix and combine with Liquorice Powder 140. In dividing this into pills, roll them in a mixture of reduced iron and lycopodium, and varnish.

P1 **Pilula Garrodii** (Pilula Ferri Iodidi et Sodii Arsenatis E.G.A.)

Pill of Ferrous Iodide 2 grains, Exsiccated Sodium Arsenate $\frac{1}{36}$ grain, Extract of Belladonna $\frac{1}{12}$ grain.

Syrupus Ferri Bromidi, B.P.C., 1901.

Dose.—½ to 1 drachm (2 to 4 Cc.).

Dissolve sugar 14 ounces in Distilled Water 6 ounces; add Bromine 533 grains to Iron Wire, free from oxide, ½ ounce and water 4 ounces in a suitable vessel surrounded with cold water. Shake until the froth becomes white and the reaction is complete. Filter the solution into the warm syrup and add, if necessary, Water to produce one pint. Each drachm contains about 4½ grains of Ferrous Bromide.

Ferri Oxalas, $Fe(COO)_2\,2H_2O = 179·872$. *Syn.*—FERROUS OXALATE, PROTOXALATE DE FER. F.E. and P. Hung.

Dose.—1 to 5 grains (0·06 to 0·3 Gm.).

Yellow crystalline powder, insoluble in water but soluble in dilute acids. Has been given in anæmia and as a nerve tonic.

Ferri Phosphas Saccharatus. **Saccharated Iron Phosphate** (*B.P.* '14).
Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**).

An amorphous powder containing at least 60% of ferrous salts calculated as $Fe_3(PO_4)_2, 8H_2O=501·702$.

Ferri Phosphas Solubilis, U.S.X., is a green soluble sodio-citro-ferric phosphate. Contains Ferric Phosphate equal to 12% Fe.

According to Squibb the following gives a green salt. Dilute Iron Persulphate solution 135 Gm. with water 300 Cc. Pour this rapidly, with constant stirring into Caustic Soda 50 Gm., dissolved in water 300 Cc. in a vessel of 2,000 Cc. capacity.

Decant and wash thrice. Drain off most of the water and add the magma gradually to Citric Acid 55½ Gm. and Sodium Phosphate 76 Gm. in just sufficient cold water to dissolve. Allow to stand 24 hours at about 60° C. to dissolve and filter. Concentrate at not exceeding 60° C. and scale without heat.—P.J. ii./09,405.

Ferri Pyrophosphas Solubilis, U.S. VIII.

Contains ferric pyrophosphate corresponding to not less than 10% metallic iron. *Average dose.*—4 grains.

Syrupus Ferri Phosphatis (*B.P.* '14).
Dose.—½ to 1 drachm (**2 to 4 Cc.**). One drachm contains 1 grain of anhydrous ferrous phosphate. Keep in bottles quite full.

Syrupus Ferri Phosphatis Compositus, B.P.C. *Syn.* CHEMICAL FOOD; PARRISH'S SYRUP (*modified*). *Dose.*—½ to 2 drachms

Iron Wire, free from oxide, 37½ grains. Concentrated Phosphoric Acid, Sp. Gr. 1·5, 1 ounce, Distilled Water 5 drachms. Place in a glass flask, so that the liquid completely covers the wire, plug with wool, and heat gently till dissolved.

Mix Precipitated Calcium Carbonate 120 grains, Concentrated Phosphoric Acid 4 drachms, Distilled Water 2 ounces, and add Potassium Bicarbonate 9 grains and Sodium Phosphate 9 grains. Then add the solution of phosphate of iron, filter and set aside.

Boil Cochineal 30 grains with distilled water 7½ ounces 15 minutes, cool and filter, pouring over the filter sufficient water to produce 7 ounces. To this add refined sugar 14 ounces.

Heat till dissolved and strain. When cold, add the solution of phosphates, Orange Flower Water 1 ounce, and sufficient water to measure 1 pint.

Cudbear is better than Cochineal. Mix with an equal quantity of clean sand and percolate.—F. Goldby, P.J. i./15,576. The addition of orange flower water to the original formula has made the final volume incorrect.—*ibid.*, 518.

Contains in each drachm ½ grain Iron Phosphate and ⅘ grain Calcium Phosphate with small quantities of the phosphates of potassium and sodium. It should be kept in bottles quite full. A small proportion of glucose added, assists keeping qualities. It is not too nauseous to administer to children, for whom it is frequently prescribed.

Acidity.—The ordinary preparation, as sent out by manufacturers, contains about 3½% free Phosphoric acid, apart from another 2½% approximately, associated with the bases to form acid salts of Lime and Iron. 3½% Free Phosphoric Acid means that each drachm of the syrup contains the equivalent of 20 m. of dilute Phosphoric acid.–A. J. Jones, P.J. i./22,61. A speaker said he made the syrup only ¼ the strength of Syrup of Ferrous Phosphate in iron, and in the case of the Phosphoric acid he used 3 ounces instead of 5 ounces. *Ibid.* p. 63.

The Sp. Gr. of this Syrup may increase owing to inversion of the sugar.—C. M. Caines & N. Evers, P.J. ii./25,139.

A precipitate of Ferric Phosphate may form.—P.J. ii./26,180.

The excessive Phosphoric Acid in phosphatic syrups militates against genera use. If a means could be devised to reduce, it would be a great boon.—R Wright, P.J., i./26,256.

For estimation of Iron and Calcium in this Syrup, see Vol. II.

Capsules of Chemical Food are each equivalent to 1 drachm.

Ⓟ **Syrupus Ferri Phosphatis cum Quinina et Strychnina** (*B.P.* '14).

Syn. EASTON'S SYRUP, SYRUPUS TRIUM PHOSPHATUM.—G.H.

Dose.—½ to 1 drachm (**2 to 4 Cc.**).—One drachm represents 1 grain of anhydrous ferrous phosphate, ⅘ grain Quinine Sulphate and $\frac{1}{32}$ grain Strychnine. As this Syrup becomes discoloured it is more satisfactory to make only small quantities at a time. Sp Gr. approx. 1·290. The percentage of Strychnine in the syrup is 0·057 w/v, equivalent to 0·044% w/w for Sp. Gr. 1·29.

The acid liquor is officially filtered into the syrup, and afterwards made up to a pint. If the solution is made up to *about* 6 *ounces* filtration is much *more rapid* and exposure to air less.

A new formula. Less acid than the B.P. and keeps better. Iron wire 8·6 Gm., Phosphoric Acid Conc. 42·5 Cc., Hypophosphorous Acid 40 Cc., Strychnine 0·57 Gm., Quinine Sulphate 14·8 Gm., Syrup 666·6 Cc., Distilled water to 1,000 Cc. The Hypophosphorous Acid is added to the solution of Iron and the alkaloids before filtering into the syrup.—J. H. Franklin, P.J. i./27,55.

U.S. VIII. employed Ⓟ Glyceritum Ferri, Quininæ et Strychninæ Phosphatum 25, *q.v.*, Syrup to 100. *Average dose.*—1 drachm.

(Easton's Syrup was dismissed from the U.S.P.)

Flavoring.—One drachm requires Syl Aurantii Amari 2 or 3 drachms and water to 1 ounce (or less). Extractum Glycyrrhizæ Liquidum covers, but not so good as Syl Aurantii Amari.

It improves the coagulability of the blood. The excess of acid in this Syrup is said to be injurious to the teeth.

With Syrup of Iodide of Iron (*q.v.*) also made with Glycerin is compatible in the concentrated form, but not if diluted.

Ⓟ **Liquor pro Syrupo Eastoni.** 3 with 7 of Simple Syrup = **Easton's Syrup** (*i.e.*, 144 minims with Simple Syrup *q.s.* to 1 ounce).

Add to a Solution of Ferrous Phosphate 5 ounces (produced by dissolving Iron Wire 150 grains in Phosphoric Acid, Sp. Gr. 1·5, 2¼ ounces and water *q.s.* to 5 ounces), **Liquor Eastoni sine Ferro** 7 ounces (made by dissolving Strychnine 10 grains and Quinine Sulphate 260 grains in Phosphoric Acid warmed, 2 drachms and adding water *q.s.* to 7 ounces). Is better recently prepared. The Solution of Ferrous Phosphate keeps for a moderate time in stoppered bottles, which should be as full as possible to prevent exposure to the air.

Easton's Syrup and Syrupus Ferri Phosphatis B.P. increase in Specific Gravity on keeping, owing to inversion of the sugar.—C. M. Caines and N. Evers, P.J., ii./25,139.

Both Easton's Syrup and Chemical Food may throw down Ferric Phosphate. Easton's Syrup is also liable to deposit Quinine Phosphate.—L. B. Timmis and N. Evers, P.J., ii./26,180.

Liquor Eastoni sine Ferro.—Some protracted experiments by us showed that this Liquor can be kept almost colourless by using Sulphurous Acid (5%) in proportion of 1 minim in 3 ounces. This is better than Hypophosphorous Acid, which has been used by some. The bottle must be kept stoppered, *i.e.*, air must not have access to the Liquor.

Hypophosphorous Acid and Sulphurous Acid must not be used together.

Easton's Syrup in Two Syrups.

(*a*) Mix Liquor Ferri Phosphatis 5 with Syrup *q.s.* to 20.

(*b*) Mix Liquor Eastoni sine Ferro 7 with Syrup *q.s.* to 20.

These keep well separately. Mix at time of dispensing.

Ⓟ **Syrupus Triplex.** Understood to mean a mixture of equal parts of Easton's, Fellows' and Parish's Syrups. **Edin. Royal Infirmary** has 1, 1 and 2 respectively.

Physicians should specify in prescribing which formula is intended.

Ⓟ **Elixir Ferri Phosphatis cum Quinina et Strychnina.**—*Martindale. Dose.*—½ to 1 drachm (**2 to 4 Cc.**).

The same strength as the B.P. **'14** *Easton's Syrup.* Prepared with Simple Elixir ('94) in place of Syrup as a vehicle.

Easton's syrup has its equivalent dose in the following pill, which is portable, tasteless, and readily soluble:—

[P1] **Pilula Ferri Quininæ et Strychninæ Phosphatum.** EASTON'S PILLS.—*Martindale.*

Contain Ferrous Phosphate and Quinine Sulphate of each 1 grain (**0·06 Gm.**), Strychnine $\frac{1}{32}$ grain (**0·002 Gm.**), Milk Sugar 1¼ grains (**0·08 Gm.**), Concentrated Phosphoric Acid *q.s.*

Mix quickly, having first triturated the Strychnine with the Milk Sugar, and prepare the pills. Finally varnish with Sandarach Varnish. Also made one-half this strength. Either may be combined [P1] with Arsenious Acid, $\frac{1}{60}$ grain (**0·001 Gm.**).

Ⓟ **Glyceritum Ferri, Quininæ et Strychninæ Phosphatum. U.S. VIII.** *Syn.*—**Glycerole-Easton.**

A substitute for the syrup for administration where sugar is not desirable. It keeps better than the syrup and is palatable.

Average dose.—15 minims (**1Cc.**) containing approximately Soluble Ferric Phosphate 1¼ grain (**0·08 Gm.**), Quinine as Phosphate 1½ grain (**0·1 Gm.**), Strychnine base $\frac{1}{60}$th grain (**0·001 Gm.**).

[P1] **Tablets of Easton's Syrup** are each equivalent to ½ and 1 drachm of the syrup. (Sugar coated.)

[P1] **Capsules** equivalent to ½ and 1 drachm of Easton's syrup are also prepared and each **combined** [P1] **with Arsenic** $\frac{1}{50}$ **grain.**

[P1] **Pilula Trium Phosphatum, G.H.** Is similar to our Formula for Easton's Pills.

Ferri Sulphas (*B.P.* '14). $FeSO_4, 7H_2O=278{\cdot}016$. **Ferrous Sulphate.** *Dose.*—1 to 5 grains (**0·06 to 0·3 Gm.**).

In clear, pale, bluish green crystals, soluble 1 in 1½ of water.

A saturated solution with some crystals of the salt in excess keeps better than a weak solution, in the latter oxidation soon takes place.

Flavoring.—Glycerin or Syrup.

Relieves anæmia more thoroughly than carbonate or phosphate.—1% solution of Ferrous Sulphate prevented development of ankylostoma ova and all died in 24 hours.—L. i./10,355.

Ferri Sulphas Exsiccatus (*B.P.* '14). U.S. X., P. Jap. IV. *Dose.*—½ to 3 grains (**0·03 to 0·2 Gm.**). 5 grains=8 of the preceding.

Best administered in pill, as:—

Pilula Ferri Sulphatis 3 or 5 grains, with syrup *q.s.* Dissolving slowly, these pills do not derange the stomach. If made with lanolin or kaolin ointment as excipient will not crack.

Liquor Ferri Subsulphatis, U.S. IX. **Monsel's Solution.**

Dose.—3 to 6 minims (**0·2 to 0·4 Cc.**).

A solution of basic ferric sulphate When evaporated and scaled forms **Monsel's Salt or Ferric Subsulphate** $Fe_4O(SO_4)_5$. *Dose.*—½ to 2 grains (**0·03 to 0·12 Gm.**).

A spray of 20 grains to the ounce checks hæmoptysis, and internally is not irritating although astringent.

Unguentum Ferri Persulphatis.—Ferric Sulphate 10 grains, Almond Oil ½ drachm, Conium Ointment to 1 ounce.—Prov. Hosp. (General Hosp, Notts.).

The name Persulphate may be taken to mean normal **Ferric Sulphate** $Fe_2(SO_4)_3$ as contained in Liquor Ferri Tersulphatis, U.S.

Ferri et Magnesii Sulphas. $FeSO_4MgSO_4,6H_2O=380·384$.

Dose.—2 to 10 grains (**0·12 to 0·6 Gm.**).

A double salt containing about half its weight of each sulphate; green crystals, soluble 3 in 4 of water.

In 10-grain doses has no astringent or aperient action, hence suitable for prolonged use in chlorosis and anæmia.

Ferri et Manganesii Citras.

Dose.—3 to 15 grains (**0·2 to 1 Gm.**).

In reddish scales, freely soluble in water. Useful in chlorosis, combining the action of the two elements.

Ferro-Alumen. **Iron Alum.**—*Syn.* FERRIC AMMONIUM SULPHATE. $Fe_2(SO_4)_3.(NH_4)_2SO_4.24H_2O=964·4$.

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**). Amethyst coloured efflorescent crystals, of astringent taste. *Soluble* 1 in 3 of water (best with a little sulphuric acid added), insoluble in alcohol. Internally to arrest hæmorrhage, also as an astringent gargle (2%), throat spray or pigment.

Ferri et Potassii Tartras (*B.P.* '14). FERRUM TARTARATUM.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**).

Reddish brown scales soluble in water about 1 in 1. Prepared by evaporating a solution of Ferric Hydroxide in Acid Potassium Tartrate. 10 Gm. incinerated yield not less than 3 Gm. of residue.

Menorrhagia of young females is well treated by this tartrate.

For mucous disease, this or the Ammonio-Citrate is given with alkali in Calumba infusion.

Tinctura Ferri Tartarata.—Ferrous Sulphate 8, Potassium Bitartrate 4, Distilled Water 30. Digest 24 hours in a covered vessel, then add Alcohol 68% 70, stand one hour and filter.

Ferri et Ammonii Tartras U.S. VIII. *Average Dose.*—4 grains. Contains not less than 13% metallic iron.

Molybdenum (Mo=96·0). This metal is found chiefly as its Sulphide **Molybdenite** MoS_2. It is employed for hardening steel. Unlike ordinary Carbon Steel, Molybdenum Steel has the property of retaining its temper even when heated to a high degree, hence cutting tools made with it are able to make deep cuts at high speed—the steel may in fact be heated to dull redness without impairing its quality. Molybdenum has Sp. Gr. 8·6.

FILIX MAS.

The rhizome of *Dryopteris* (*Aspidium*) *Filix-mas*. The Male Fern.

Extractum Filicis Liquidum (*B.P.* '14).

Dose.—45 to 90 minims (**3 to 6 Cc.**).

Prepared by ether extraction—the yield being about 9 to 10%.

It contains (*B.P.*' 14) not less than 20% of **Filicin**, the anhydride of Filicic Acid, stated to be inactive as a vermifuge. *Vide* p. 423.

Oleoresina Aspidii, **U.S.** is also made by ether percolation.

Average Single Dose.—30 grains (**2 Gm.**) once a day.

Assay and methods for detecting adulteration of, vide Vol. II.

Flavoring.—The taste of this preparation is horrible. Best prescribed as capsule, or if in a draught, it is best ordered with Mistura Amygdalæ, with a little Essential Oil, *e.g.*, Cinnamon.

Uses.—For all varieties of tapeworm and the *ankylostomum duodenale* may be administered fasting, in capsules, or emulsified with about half its weight of compound tragacanth powder. The dose should be preceded and followed by a brisk purgative.

For tapeworm the following routine has been successful in most obstinate cases. Light food at tea-time—purgative at bedtime (Magnesium Sulphate and Jalap suitable), purgative again in morning, after action give vermifuge. Liquid Extract of Male Fern 1 drachm, Mucilage of Acacia 1 drachm, Cinnamon Water to 1 ounce. After passage of the worm give Castor Oil to remove remaining vermifuge from the bowel. N.B.—We do not consider Castor Oil ideal for the purpose. At any rate, it is not advised *before* or *with* a Filix Mas preparation.

In a most stubborn case of *T. Solium*, of which we have information (1927), the method was, however, ineffectual, as also were Infusion of Kousso and Pelletierine Tannate.

For a slight modification of the method, *see* L. ii./27,766.

Capsules contain 15 minims (**1 Cc.**) of Liquid Extract. *Dose.*—1 to 4. Yeo mentions Capsules of 7½ minims of Male Fern Extract with 1 grain of Calomel, sixteen for a dose—two every ten minutes.

Male Fern Extract (40 minims in an ounce of milk flavoured with Peppermint Oil, 2 minims) must be given on an *empty* stomach. An aperient, Magnesium Sulphate or Sodium Sulphate, should be taken first in a good quantity of water (8 to 10 ounces).—B.M.J. i./17,624.

We learn from Dr. Wakeman that the tapeworm is rife in Abyssinia. The natives drink cold infusions of Kousso but this seldom brings away the head of the worm. They much prefer Male Fern capsules when they can get them—these act effectively especially when followed by 1 to 2 drachms Compound Jalap Powder. **Pills and Tablets** containing 3 minims of Male Fern Extract are suggested. These are of convenient size—three or four for a dose.

TUBERCULOUS CONDITIONS are stated to have benefited under treatment with ether-alcohol extract of fresh plant. Children to receive ¾ grain, adults 1½ grains, in pills, twice daily for 10 to 15 consecutive days each month.

Dangers of Filix Mas. Moderate doses almost invariably produce bilirubinæmia and in large doses jaundice. There is risk of chronic cirrhosis of the liver developing.—O. Hannsen, L. ii./22,1188.

Toxicology of Filix Mas. A case seriously affected.—L. i./11,109.

Poisoning from use of Male Fern Extract in Castor Oil—the case was actually Addison's disease and not parasitic infection.—B.M.J.E. i./15,44.

About 100 cases of serious impairment of vision have been reported following administration of Filix Mas, mostly in South Germany and Switzerland.—per Jl. Trop. Med., Apl. 15, '25,168.

Haustus Filicis Maris, L.H. Liquid Extract of Male Fern, 1 drachm; Syrup of Ginger, 1 drachm; Tincture of Quillaia, ½ drachm; Peppermint Water to 1 ounce.

Mistura Filicis, U.C.H. *Dose.*—1 ounce.

Liquid Extract of Male Fern 1 drachm, Powdered Acacia 1 drachm, Chloroform Water to 1 ounce.

Filicin and other Principles of Male Fern.

Great confusion exists, relative to the chemistry and clinical results, with the constituents of the rhizome.

The statement is generally made that the anhydride body **Filicin**, on which the Liquid Extract *B.P.* '14 and the Oleoresina Aspidii U.S. are assayed, is inactive.

The *dose* of Filicin, if given, may be stated as from 5 to 15 grains.

In our recent personal knowledge, in a single case, it was not a tænicide, the 'filicin' having been specially made in our Laboratory on the lines of the B.P. method. At the same time, tænia cases are often *exceedingly obstinate* and it is difficult to believe the following, from the *Presse Medical*, has been communicated without proper foundation.

> "Filicin" prepared by triturating the ethereal extract of Filix Mas with 10 times its weight of Magnesia. The liquid is filtered off and rejected. The Magnesia compound is treated with water and filtered and Hydrochloric Acid added to this: the resulting precipitate, which is dissolved in Ether and then dried, is "Filicin" (this is, of course, simply a modification of the usual assay method). It is soluble in Ether, slightly in Alcohol, but insoluble in water. It is a combination of various acid bodies. Given by the mouth in large doses, it causes vomiting and diarrhœa. It is eliminated by the bile. An investigation on flat-worms and tape-worms showed it to be an excellent helminthicide: the ingested Filicin reaches the intestine, impregnates the tænia, passes into the blood and then into the bile and returns to the intestines, where it again acts on the parasites—this cycle being repeated many times. The drug is given in pills or capsules (in oil solution) in 12-grain doses for adults, and to children ¾ grain for each year of age. There are no toxic effects if given in suitable doses. Tænia are stated to be expelled in a few hours. Combined with Calomel, both an anthelmintic and purgative action is obtained.—B.M.J.E., i./27,20.

The view has been stated that a compound termed **Filmaron**, a parent substance of 'Filicic Acid,' is the active one, present to the extent of 5% in the rhizome. This is a proprietary article of which there is little knowledge. It is noteworthy that the P.G. assay process for '**Filmaronöl**' simply determines Filicin in the oil on the lines of the B.P. assay. Some comparative clinical data would be of great value.

A preparation termed **Danistol**, for use in liver fluke (*Syn.* liver rot, Distomiasis) in sheep, etc., is stated to contain a derivative of Male Fern (of the formula $C_{44}H_{50}O_{15}$), in capsule form. They contain *Benzol* as solvent and a further variety contains Carbon Tetrachloride as solvent. We have worked on the veterinary side of the issue as well, and have knowledge (1927-8) of the utility of a capsule of Filicin in Benzol in the affection named, but by far the best results were obtained from a capsule containing a filicin in the form of liquid extract *with* a *small* dose of Carbon Tetrachloride.

Filicic Acid, in conclusion, is sometimes spoken of. It is best to ignore the name. Filicin as above defined may be supplied for it.

Aspidinofilicinum Oleo Solutum P.G. VI. *Syn.* Aspidinolfilizinöl, Filmaronöl, is a 10% solution in a neutral vegetable oil.

For further data re Assay and Adulteration vide Vol. II.

Other tæniacides are **Kamala** (discarded from B.P.), the glandular red powder attached to the capsule of *Rottlera tinctoria*; *Mallotus Philippinensis* (*Euphorbiaceæ*); this may be given in dose of 30 to 120 grains suspended in water; **Cowhage, Dolichos pubes,** the hairs adhering to the pod of *Dolichos* or *Mucuna pruriens* (*Leguminosæ*), *dose* 1 or 2 grains in treacle or honey; **Papain,** and **Thymol Carbonate,** *q.v.*, but an efficient tæniacide is **Pelletierine Tannate,** *q.v., cf. also Carbon Tetrachloride and Oleum Chenopodii.*

GELATINUM (*B.P.* '14). U.S.

Nearly colourless transparent sheets or shreds made by extracting animal tissues, bones, etc., with boiling water.

Skin Gelatin is the best. It is more pliable and possesses more 'fibre' and is suitable for gelatin capsule making. Bone gelatins made from **Osseine** (acidulated bone) are brittle and hence unsuited.

Dose.—Ad libitum *per os*, and injected.

Sterules of Concentrated Saline Gelatin Solution are prepared for injection into the gluteal region as a hæmostatic; each makes a 2% solution on dilution with boiled water to 5 ounces—sufficient for one injection at 103° F. Injections of this amount are made every third day in the flank or buttock, up to 30 or 40 injections.

These constitute the great standby in treatment of hæmoptysis of tuberculosis.—English's System of Treatment, vol. i., 1154.

G. W. Davis (L. Sept. 8, 1900) gave 6 ounce subcutaneous injections of 1% Gelatin with Cerebos Salt 0·3% for hæmorrhage.

The solution is sometimes used stronger, *e.g.*, 10%,—*i.e.*, the contents of the Sterule diluted to 1 *ounce* (30 Cc.).

Gelatina Soluta Sterilisata, P. Helv. is 10% in Normal Saline. The utmost precautionary directions are given, including animal experiments, to exclude organisms of malignant œdema and tetanus.

Liquor Gelatinæ Sterilisatus, P. JAP. IV. is similar, but strength of Sodium Chloride 0·5%. The Solution is neutralised with Sodium Carbonate and filled into hard glass tubes containing 10 to 40 Cc. sealed and sterilised thrice each time for 15 minutes at 24 hour intervals. The name of the laboratory and volume of contents to be given on each tube.

Soluté de Gélatine Injectable.—FR. CX. Supp. Nouv. 1926. Substitutes the formula on p. 668 of FR. CX.

Official Gelatin 10 Gm., Sodium Chloride 8 Gm., Distilled Water to 1,000 Cc. Neutralise to Litmus accurately by adding drop by drop N/10 Sodium Hydroxide. Sterilise for 15 minutes at 115° C. in an autoclave.

Uses.—To check bleeding from the lungs, from the intestines in typhoid and dysentery, from the bladder and from the stomach in ulcer and cancer of that organ. These injections may be followed by pain, fever, local swellings and nettle rash. Other hæmostatics may be combined with it.

AORTIC ANEURISM is relieved by subcutaneous injection of the solution. Secondary hæmorrhage well treated. Blood which ordinarily coagulates in 7 minutes clots in 3 minutes after an injection. Dose is about **5 Gm.** in a 1% solution. Very useful in cases of ruptured tubal pregnancy.—L. ii /08,1782.

Intrathoracic aneurysm. The solution advised by Lancereaux in 1904 consists of Gelatin 25, Sodium Chloride 7. in Water 1,000 (=2·5%). He injects 200 Gm. at a time and repeats every 4 or 5 days. Sir J. K. Fowler begins with 50 Cc. of 2% Solution and gradually increases to 100 Cc. and 4% respectively. Guthrie Rankin says the relief of pain is striking.—F. De Havilland Hall, L. i./13,947.

For visceral pains and for speeding up healing process: 5 or 10 Cc. of 5% solution injected. Aneurysm (60 cases) well treated with 100 Cc. 2% solution weekly.—per Jl. A.M.A., i./26.519.

It is the most powerful *protein-sparer* known, being able to save from destruction half its weight of protein or twice as much as is spared by an equal quantity of carbohydrate. 1 Gm. yields about 4·1 Calories.—R. Hutchison.

For GASTRIC ULCER gelatin is very easily digestible. A diet of gelatin, fat and sugar has been advised. It 'fixes' a great deal of acid.

Intestinal bleeding has been arrested by administration by the mouth.

SNAKE BITE: Oozing hæmorrhage due to this occurs from all mucous membrane; well treated by large quantities of 5% Gelatin Solution *per os.*—B.M.J. i./15,832.

Gelatin Solution 5 to 10% containing 5% Calcium Chloride.

To arrest hæmorrhage.—*Vide* **Calcii Chloridum.**

Formalised Gelatin.—This has been used with success as a substitute for Collodions. Gelatin Solution 10% in water is stored in wide mouth test tubes holding three ounces each. The tubes are plugged with cotton wool and sterilised at 100° C. for 15 minutes on three successive days. When required for use melt in a water bath and add 1 drachm of Formalin Solution diluted 10 times—*i.e.*, 4% strength of Formaldehyde approx.—the final product will then contain a little over 1% of Formaldehyde (H.COH) or fully 2½% of Commercial Formalin.

The wound is dressed with a thick roll or pad of sterilised gauze, with a piece of stiff gauze above extending beyond the wound. The Formalised Gelatin is applied with a swab on the top of the stiff gauze beyond the limit of the wound—this holds the dressing in place without bandage.—Communicated by the Dispenser, General Infirmary, Leeds.

For **Formalised Gelatin Capsules** *vide* Formagules.

✱ **Vernisol** (T.M. 221492).—A water-soluble varnish, or jelly which dries and leaves a transparent, flexible coating, non-irritating, and may be medicated with the usual dermatological agents.

GELSEMII RADIX. (*B.P.* '14), U.S. IX.

Dose.—5 to 15 grains (0·3 to 1 Gm.). *N.B.*—U.S. IX. gave ½ grain only as average dose.

The dried rhizome and roots of "yellow jasmine"—*Gelsemium nitidum* (*Loganiaceæ*) (*G. sempervirens*, Aiton) (*Loganiaceæ*) imported from the United States. Must be distinguished from the yellow jasmine cultivated here, which is a species of *Jasminum.*

Uses.—Has febrifuge properties, as it lowers the pulse and depresses the nervous system, being anti-spasmodic and analgesic. It has been much used in acute and rheumatic neuralgia, toothache, uterine and ovarian pain and chorea. It is a powerful paralyser, as well as tetanizer, and respiratory poison. Large doses contract the pupil and cause giddiness and diplopia.

The plant contains at least two alkaloids, one designated **Gelseminine** (crystalline), which is highly toxic, and the other Gelsemine, which is of little importance.

Antidotes.—Emetics, Atropine or Strychnine hypodermically, Nitroglycerin or Amyl Nitrite; artificial respiration, stimulants.

Accidental death from an overdose in the case of a woman suffering from neurasthenia.—P.J. i./27,558.

$\boxed{\text{P1}}$ **Gelseminina.** $C_{22}H_{26}N_2O_3=366{\cdot}224$ (Alkaloid).

This base is called by some '*Gelsemine,*' causing confusion.

Dose.—$\frac{1}{100}$ to $\frac{1}{32}$ grain (**0·0006 to 0·002 Gm.**).

Yellowish-white minute crystals, M.pt. 160° C., with a bitterish taste, sparingly soluble in water, easily in alcohol, ether and acids. It forms crystalline salts, and has mydriatic properties.

$\boxed{\text{P1}}$ **Gelsemininæ Hydrochloridum.** $C_{22}H_{26}N_2O_3.HCl$ (?) = 402·689.

Dose.—$\frac{1}{60}$ to $\frac{1}{20}$ grain (**0·001 to 0·003 Gm.**).

In white, granular crystals, freely soluble in water.

Ⓟ **Ophthalmic Gelatin Discs** contain $\frac{1}{500}$ grain **Gelseminine.**

Ⓟ **Extractum Gelsemii Pulvis.** *Syn.* GELSEMIN (EXTRACTIVE)—*avoid this name.* *Dose.*—½ to 2 grains (**0·03 to 0·12 Gm.**) in a pill with spirit and glycerin.

The powdered alcoholic extractive (resinoid) of a pale brown colour.

Ⓟ **Extractum Gelsemii Liquidum.** **By percolation with a mixture of Alcohol 4 and Water 1. Strength 1=1.** *Average dose*—½ minim.

Dysmenorrhœa is well treated by 3 minim doses with 5 minims of Tincture of Belladonna thrice daily.

For examination nervousness a small dose thrice daily is a tonic.

Ⓟ **Tinctura Gelsemii** (*B.P.* '14).

Gelsemium in No. 40 powder 2, Alcohol (60%), *q.s.* to 20. Percolate. The tincture is fluorescent.

Dose.—5 to 15 minims (**0·3 to 1 Cc.**), often combined with Bromide of Ammonium or Potassium for neuralgia.

Flavoring.—Syl Anethi, Syl Rosæ; Syrupus Aurantii.

Uses.—For neuralgia of face and jaws associated with carious teeth—15 minims of the tincture every 6 hours may relieve.

Neuralgia has been treated by ½ drachm doses thrice daily for two months. Disordered vision may follow even moderate doses.

In rheumatoid arthritis it is given with Cimicifuga *q.v.*

INFLUENZA well treated by the following:—

Gelsemium Tincture 12 minims, Belladonna Tincture 5 minims, Potassium Citrate 10 grains, Syrup of Orange 1 drachm, Chloroform Water to 1 oz. *Dose.*—1 ounce every four hours. Afterwards ½ oz. until temperature falls to normal. Headache and backache vanish, with general improvement. The only disadvantage is that Gelsemium may cause ocular disturbance.—W. D. D. Small and W. O. Blanchard, B.M.J. i./19,241.

GLUCOSUM.

Syn. DEXTROSE, GRAPE SUGAR. $C_6H_{12}O_6=180{\cdot}096$.

Liquid Glucose occurs as a viscous mass containing about 20% moisture and of Sp. Gr. 1·6 approx. It is prepared by acting on Starch with Dilute Hydrochloric Acid. Further varieties are **Pure Dextrose** in white 'granular' powder, and **Solid Glucose** less pure in yellowish masses containing 10 to 20% of bodies allied to Dextrin, viz., Amylin and Gallisin.

Saccharum Amylaceum P.G. VI. White crystals or powder. A 10% solution with 1 drop of Ammonia of the substance dried at 105° C. has a Specific Rotation of + 52·5° at 20° C., using Sodium light.

Glucose Officinal.—FR. CX. NOUV. SUPP. (1926) is pure anhydrous *d*-Glucose—a white crystalline powder, with M.pt. 146° C. Two varieties are described, *d*-Glucose α got by crystallisation at 30 to 35° C., and *d*-Glucose β, by evaporating at 110° C. In solution one form is changed into the other, with resulting equilibrium. A Monohydrate (110 Gm. of which equals 100 Gm. of anhydrous) also exists and is permitted.

GLUCOSE of commerce (Liquid) is of two kinds, 'Crystal' and 'Neutral.' 'Crystal' is the neutral variety bleached with Sulphites. It is 'water-white' and contains up to 7 grains Sulphur Dioxide per lb. The neutral is of pale yellow colour and is usually free from traces of Sulphur Dioxide. Its flavour is superior to the crystal variety. It has approximately a quarter the sweetness of refined sugar and it is not so good a preservative. Analyses of Crystal Glucose showed Dextrose 34 to 48%, Dextrin 30 to 45%, Sulphur Dioxide free and combined 0·03 to 0·1%, Moisture 14 to 20%.—H. H. Robins, C.D., Mar. 31/17.

If Cotton Wool is treated with Sulphuric Acid one vol. and water 3 vols. a viscous solution is produced which becomes later as fluid as water. From this Glucose is obtained.—C. T. Cross, C.D. i./17,252.

Glucose Sterules are prepared for artificial feeding as a preliminary to severe operations, and for wasting diseases. They were suggested by A. E. Barker, and can be carried about for serious operations. The contents of one, diluted to a pint with boiled water, makes a 5% solution (isotonic with the blood). A litre of this solution may be injected, and only causes evidence of sugar in the urine after repeated injections and only to the extent of 2 to 3% of the quantity given. An aspirator needle about 1 mm. in section and 3 feet of tubing with a glass reservoir above is all the apparatus required. The needle is introduced under the skin of the arm near the axilla—the douche is raised 2 feet or so and transfusion proceeds. The treatment is good as regards pulse, general strength and relief of thirst. By this means, water, the first need, is given in large amount with safety, and sugar to the extent of 2 ounces per diem without any demand upon the alimentary tract. Increased action of the kidneys is caused and diluted toxic matters are removed.

The solution is also used *intravenously* with the addition at the time of dilution of 4 to 8 drops of Adrenalin Solution.

Soluté de Glucose Hypertonique Injectable.—FR. CX., Nouv. Supp., '26. Official Glucose 300 Gm., Distilled Water to 1,000 Cc.

Soluté de Glucose Isotonique Injectable.—FR. CX., Nouv Supp., '26, is 5% Isotonic Solution, sterilised at 110° C. in neutral glass.

GASTRIC ULCER has been treated by giving nothing, not even water by the mouth, and supplying 3 or 4 pints daily of Saline Sugar Solution—the method gives the ulcer every chance of healing. Secondary parotitis may however occur, special care is hence necessary to use antiseptic mouth washes. The method should be valuable in treating ailments in which natural feeding is difficult, *e.g.*, in the hyperemesis in pregnancy and in cholera.

PERFORATION OF THE STOMACH AND DUODENUM.—The Injections help to raise vascular tension lowered by sweating, vomiting and toxæmia.—A. E. Barker, B.M.J. i./13,106.

SEVERE DIABETES treated, especially in cases where acidosis threatened.—Sir W. H. Willcox, B.M.J. ii./21,706.

IN PNEUMONIA the heart can be best helped by giving it food and oxygen. The best food is sugar. Intravenous injections of 10% Glucose are perhaps the most valuable when circulatory failing has commenced.—W. H. Wynn, L. ii./22,496.

VOMITING OF PREGNANCY. Glucose injections useful.—V. J. Harding and B. P. Watson, L. ii./22,649.

Intravenous injections of 50 to 75 Gm. of Glucose in 200 to 300 Cc. distilled water (25% solution) used. The addition to the injection of 1 unit of Insulin to 5 to 10 Gm. Glucose did not seem to have any clinical advantages.

Vomiting usually ceased in 12—24 hours.—P. Titus, Jl. A.M.A., ii./25.491. W. Thalhimer gives 100 Gm. of Glucose intravenously in as much water as the condition of the patient indicates (1 or 2 litres), the injection taking from 3 to 5 hours, and administers *hypodermically* 1 unit of Insulin for every 3 Gm. of Glucose. Vomiting usually ceased in 6 to 8 hours.—*Ibid.* 493.

JAUNDICE.—Intravenous injection of 500 Cc. of a 10% Glucose solution may be indicated two or three times a day to rehabilitated patients with abnormally functioning livers. In jaundice, intravenous injections of 5 Cc. of a 10% solution of Calcium Chloride help to hasten coagulation of blood, prevent post-operative bleeding and neutralise the toxic bile pigments.—W. Walters and W. J. Mayo, Jl. A.M.A., ii./25,885.

TOXÆMIA with gastric stasis well treated by intravenous injections of 10 Gm. (1%) Sodium Chloride, and 100 Gm. Glucose (10%), in 1,000 Cc. freshly distilled sterile water. Twenty minutes allowed for injection, 1, 2 or 3 litres being injected daily, supplemented by hypodermoclysis and proctoclysis.—Per Jl. A.M.A., ii./25,637.

BRIGHT'S DISEASE with scanty urine. Contents of a sterule diluted with a pint of distilled water intravenously—effect most satisfactory.—Major G. W. Vincent, Maymyo, Burma, Oct. 4, '25.

THREATENED ŒDEMA OF THE LUNG and collapse averted by intravenous injection of 20 Cc. 50% solution.—B.M.J.E. i./16,11.

CHRONIC ARTHRITIS. Glucose tolerance in. A lowered glucose tolerance is present in a large proportion of cases.—G. L. Kerr Pringle and S. Miller, L. i. 23,171.

Value of Rectal Feeding. Absorption of Dextrose (5% solution in Saline solution when so given) is proved by the way it raises respiratory quotient and abolishes or diminishes acidosis; on the other hand protein absorption is either nil or exceedingly minute,—the salts in foods of this kind are absorbed and probably produce what good is done.—there is indeed no place in therapeutics for nutrient enemata containing protein and fat.—B.M.J. i. 11,872.

DELAYED CHLOROFORM POISONING treated by rectal injection of Sodium Bicarbonate. Also Glucose Solution ½ ounce in ½ pint of Milk by nasal tube and a 10% solution by the rectum four-hourly, in addition to a good supply of Carbohydrate food. Improvement nothing short of marvellous, and recovery perfect.—L. ii./09,710.

CYCLIC OR RECURRENT VOMITING. All food should be withheld from the stomach and rectal feeding substituted. Glucose should be added to the Normal Saline for rectal use not only as food, but because the adequate use of fat requires co-operation of active Carbohydrate metabolism.—P.R.S.M. Diseases of Children Sect. Feb. '10,85.

ACETONURIA.—***Feeding with Glucose*** (a heaped teaspoonful in half a teacup of cold water repeated every 2 hours for 4 or 5 doses), appears to give relief in practically all cases. 99% of cases of vomiting at sea are accompanied by increased acidity and acetonuria.—M. Fawkes, B.M.J., i./25,241.

EPILEPSY associated with hypoglycemia well treated with a daily dose of 50—100 Gm. of Glucose dissolved in water with lemon juice, or 200 Gm. of sugar by the mouth.—Presse Med., Nov. 7, '25, per Jl. A.M.A., ii./25,1998.

ACUTE INFECTIONS AND CASES OF UNDER-NUTRITION.—Glucose, ½ to 1 lb. daily with food of distinct benefit. (Normal persons can assimilate 200 to 500 Gm. in one dose without glycosuria).—T. Izod Bennett and E. C. Dodds, L. i./25,429. Cane Sugar used similarly, good in typhoid and febrile diseases.—J. A. Ryle, *ibid.* 515.

CARDIAC FAILURE. 1 drachm doses of 5% solution *per os* apparently saved life.—G. Scott MacGregor, B.M.J. i./21,158; see also S. E. Denyer, *ibid.* 248.

Glucose as Surgical Dressing.—The wound is dusted with powdered glucose and covered with strips of protective silk, having been first cleaned with tampons soaked in hot boiled water. May be painful. In some cases antiseptics may be wanted before the glucose. The sugar acts as a nutrient to the tissues. Also used as MOIST DRESSING.—L. i./13,651.

ULCERS dressed with 40% Glucose; also to replace the Liquid Paraffin in B.I.P.P.—B.M.J. ii./18,574.

Bromidrosis, ozæna, otorrhœa treated by swabbing with 25% Glucose solution. Chronic vaginal discharge treated by 25% Glucose Pessaries in gelatin basis.—T. H. C. Benians, B.M.J. i./18,669.

For Estimation of Glucose in Urine *see* Vol. II.

Dextrin (P. Helv.).—Yellowish powder or gum-like masses. Is obtained commercially by heating starch to 200° C. According to P.G.I. it is made by heating potato Starch 150, with Oxalic Acid 4 in water 750 with frequent stirring until a little of the mixture no longer gives blue with Iodine. Dextrin takes up some Iodine without colouring. It is necessary to first saturate the liquid with the Iodine and then add a slight excess to get the coloration. Neutralise with calcium carbonate and evaporate the filtered liquor. Consists principally (there are various other dextrins formed before this) of Achroodextrin which is the ultimate product of starch hydrolysis before the grape sugar stage is reached.

GLYCERINUM.

$C_3H_5(OH)_3=92{\cdot}064$.

Dose.—1 to 2 drachms (**4 to 8 Cc.**).

Manufactured by decomposing fats with alkali or superheated steam. Sp. Gr. 1·260. *Soluble* in alcohol and water in all proportions, but immiscible with Ether or Chloroform.

Ph. Ned. V. permits 11·7 to 13·6% Water. Sp. Gr. 1·230-5.

Castor-Seed Ferment (Lipase) method of splitting up oils and fats is a satisfactory one for Glycerin production. It is easy to conduct, but the Glycerin is very crude.—C.D. July 10/20,978.

The Germans when short of fat, increased production of Glycerin by yeast fermentation of sugar in alkaline medium in presence of Sodium Sulphite. Glycerin formed to extent of 36%. Americans produced it by fermenting molasses in presence of Sodium Carbonate.—B.M.J. i./22,115.

Glycerin distillation, historical, etc.—F. C. C. Robb, P.J. i./21,256.

Thousands of tons are used p.a. to prevent freezing in motor-car radiators.

Crystallisation of Glycerin occurs occasionally in the cold weather. It seems to have been first observed in 1866 and reported that year at the Paris Exhibition under Napoleon III. The melting point is 17° C.—C.D.

Uses.—Internally tends to relax the bowels. Is added to cough mixtures and to relieve forms of indigestion with gaseous distension. As an enema, ½ ounce alone or with ⅓ water added relieves constipation, and it reduces piles. Externally 1 with 2 or 3 of water prevents cracks of chilblains and forms an ingredient in a large number of skin applications. It is a useful solvent for many active principles of drugs, standing midway between alcohol and water, *cf.* **Glycetracta.** It is also a valuable preservative, *cf.* "Aqueous" Tinctures.

For burns, soak cotton wool in it and cover with oiled silk.

As a throat pigment, and for uterine application, Glycerin of Tannic Acid may be used double (*B.P.* '14) strength—1 in 2½ of Glycerin—**Pigmentum Acidi Tannici**, Glycerinum Acidi Tannici being 1 in 5.

Wounds have been treated by osmotic action by Glycerin in conjunction with Ichthyol.

Lymphagogue Action of Glycerin in labour.

A 10% Solution of Tincture of Iodine in Glycerin used, the Iodine helps to stimulate uterine contraction.—H. J. Phillips, L. ii./25, 1229,1307. See also Proc.Roy.Soc.Med., Feb. '26,26.

Glycerinum Boracis (*B.P.* '14) is not a mere solution; it has an acid reaction and when mixed with an alkaline carbonate evolves Carbonic Acid; useful in infantile diarrhœa, in 20 minim doses.

Glycerinum Aluminis (*B.P.* '14). An astringent in chronic pharyngitis; is less disagreeable than tannin.

Gargarisma Aluminis.—U C.H. 2% in Acid Infusion of Roses; C.H.W 5 grains with Tincture of Myrrh 40 minims to ounce.

Glycerin Jelly, for toilet use.

Gelatin 140 grains, Rose Water 6 ounces; soak a few minutes and heat in a water-bath to dissolve; add, when cool but still fluid, White of Egg $\frac{3}{4}$ ounce. Heat to coagulate completely, and add Glycerin 6 ounces, Salicylic Acid 12 grains. Mix well, filter through a hot-water funnel, and bottle while warm.

Lubricant Glycerin Jelly. Is somewhat softer than the latter. For toilet use and lubrication of Stomach Tubes.

Glycerinum Aluminis et Acidi Tannici.

Potassium Alum (free from iron), in powder, 1, Glycerin 6. Heat to dissolve, and add Tannic Acid 1. An astringent throat pigment. Diluted 1 in 20 as a vaginal injection.

Glycerinum cum Aqua Rosæ.

Glycerin 2, Rose Water 3. An agreeable emollient for the skin.

Lotio pro manibus.—Vic. Park.

Tragacanth Powder 1 ounce, Alcohol 90% 1 pint, Glycerin of Borax 2 ounces, Tincture of Benzoin 1 ounce, Thymol 5 grains, Oil of Lavender and Cochineal, Rose Water to 4 pints.

Glycero-alcohol. *Syn.* PETIT'S LIQUOR.

Dose.—5 to 60 minims (**0·3 to 4 Cc.**).

Glycerin 333, Distilled Water 146, Alcohol 95% 580. Is used as a solvent of alkaloids and active principles. It has Sp Gr. about 1.

Glyco-gelatin, T.H.

Gelatin 1 ounce, Glycerin (by weight) $2\frac{1}{2}$ ounces, Orange Flower Water $2\frac{1}{2}$ ounces. Soak the Gelatin in the water, then heat till dissolved and add the Glycerin. When nearly cold add carmine solution, *q.s.*

Gelatinum Glycerinatum, U.S. Soak Gelatin 1 for one hour in sufficient previously boiled and cooled water to cover it. Drain and add Glycerin 1, heat until dissolved, strain hot, and evaporate to 2 by weight.

Glyco-Gelatin Pastilles (*Soft*) The following weigh 20 grains :—

	Acidi Borici ..	gr. 2
	Acidi Carbolici ..	gr. $\frac{1}{2}$
	Acidi Citrici .. Ol. Limonis ..	gr. $\frac{1}{2}$ m. $\frac{1}{4}$
	Ammonii Bromidi	gr. 1
Ⓟ	Apomorphinæ .. Codeinæ	gr. $\frac{1}{32}$ gr. $\frac{1}{10}$
	Bismuthi Carb. ..	gr. 3
Ⓟ	Bismuthi Carb., T.H. Morphinæ Acet. ..	gr. 3 gr. $\frac{1}{40}$
	Cascara Sagrada ..	gr. $2\frac{1}{2}$
𝔇𝔓1	Cocæ Extracti ..	gr. $2\frac{1}{2}$
𝔇𝔓1	Cocainæ HCl. gr. $\frac{1}{6}$, $\frac{1}{8}$, $\frac{1}{10}$, $\frac{1}{12}$, $\frac{1}{20}$ (T.H. has $\frac{1}{10}$.)	
𝔇𝔓1	Cocainæ . .. Morphinæ ..	gr. $\frac{1}{15}$ gr. $\frac{1}{30}$
Ⓟ	Codeinæ	gr. $\frac{1}{8}$
	Convallariæ Tinct..	m. 2
	Eucalypti Olei ..	m. $\frac{1}{2}$
𝔇𝔓1	Eucalypti Olei. Cocainæ HCl..	m. $\frac{1}{2}$ gr. $\frac{1}{20}$
𝔇𝔓1	Heroin	gr. $\frac{1}{24}$
	Menthol, T.H. .. (St. Th. H. gr. $\frac{1}{4}$)	gr. $\frac{1}{6}$
𝔇𝔓1	Menthol. .. Cocainæ HCl...	gr. $\frac{1}{20}$ gr. $\frac{1}{20}$
Ⓟ	Menthol .. .. Codeinæ	gr. $\frac{1}{20}$ gr. $\frac{1}{10}$
	Menthol .. .. Eucalypti Olei ..	gr. $\frac{1}{20}$ m. $\frac{1}{2}$
Ⓟ	Morphinæ Acet....	gr. $\frac{1}{30}$
Ⓟ	Pini Pumil. Olei... Terpeni Hydratis . Heroin HCl. ..	m. $\frac{1}{2}$ gr. $\frac{1}{8}$ gr. $\frac{1}{60}$
	Sulphur Præcip .. Potassii Tart. Acid.	gr. 5 gr. 1
	Terebeni	m. 2
	Thymol	gr. $\frac{1}{32}$
𝔇𝔓1	Tussis=Cocainæ.. et Morphinæ ..	gr. $\frac{1}{15}$ gr. $\frac{1}{30}$

The **Pastils** or **Jujubes**, oval or round shape, are in the index under Trochisci '**G.**' (*i.e.*, of Gum).

Marshmallow Pastils, PASTILLES DE GUIMAUVE.
Boil incised Marsh Mallow Root 100 in Water 400, strain off the liquor. Evaporate to about 80 and mix with Tragacanth 10 and Sugar 1,000, adding Orange Flower Water 10 or more if necessary to make a mass for cutting into Pastils weighing 20 grains (1·2 Gm.). This basis may be medicated with throat remedies similar to those given under Glyco-gelatin Pastils.

Suppositoria Glycerini (*B.P.* '14). Gelatin 14, Glycerin by weight 70. Water *q.s.* to 100, suitably combined. Pour into moulds of 15, 30, 60, or 120 minims or other capacities as required. Contain 70% by weight of Glycerin. This basis may be used for gelatin **pessaries.**

U.S. orders Glycerin 80, Monohydrated Sodium Carbonate 2, Stearic Acid 8, Water 10, in Gm. for 30.

Vaginal Suppositories, U.S., are globular or oviform in shape and weigh about 10 Gm. if made with Glycerinated Gelatin, and 4 Gm. if with Theobroma Oil, *v.* also **Ovules.**

Glycerin Tampons consist of gauze and wool swabs soaked in Glycerin medicated with Ichthyol 5 and 10%, also Resorcin 1 and 2%. S. H. has Ichthamol 5, 10 and 20%.

Hollow Suppositories, composed of Oil of Theobroma. May be filled with 20, 45, or 90 grains of Glycerin ; they are prompt in action.

Hollow Suppositories and **Pessaries** may also be filled with **Bismuth** and **Cocaine Ointment, Gall** and **Opium Ointment, Liquid Extract** of **Hamamelis, Hamamelis Ointment, Adrenalin Solution.**

Cataplasma Kaolini, U.S. VIII.—Kaolin 577, Boric Acid 45, Thymol 0·5, Methyl Salicylate 2, Peppermint Oil 0·5, Glycerin 375 (all by weight). Heat the Kaolin one hour on a water bath and add the rest. **Cataplasma Salicylicum Compositum,** * **Antiphlogistine,** (T.M. 253831), * **Sorbefacin** (T.M. 303921), and **Thermofuge** are used to relieve inflammations.

Glycerin Substitutes. (Used during the war.)

No. 1.—*For external use* (for viscous effect).
Tragacanth 225 grains, alcohol 90% 2 ounces, Lavender Oil 30 minims, water to 2½ pints, *misce s.a.*

No. 2.—*For internal use* (sweetening and demulcent effect).
Mix Liquid Glucose 1 part with 3 parts of the above.

For further details see Edn. XVII., p. 430.

Ethylene Glycol $CH_2OH.CH_2OH$, is used as a substitute for Alcoho as a solvent and preservative in the manufacture of medicines and essences.

GLYCETRACTA (GLYCETRACTS).

Strength.—1 = 1 of Drug.

Dose.—The equivalent in volume to the dose of the drug, excepting those standardised, *v. postea.* For doses see the Index.

Glycerin is well known to be a good all-round solvent and preservative for medicinal substances. As Marshall remarks, "Substances which are soluble in water and insoluble in alcohol are to some extent soluble in glycerin." It should be noted that, as a general rule, glycerin extracts must contain at least 25% of glycerin to preserve them.

"Glycetracts," first described by us, C.D. i./o8,489, have the advantage of miscibility with aqueous vehicles, with exceptions (those of alkaloidal drugs made with a necessary small addition of acid would be incompatible with alkalis). Many are suited both for internal and local use; they keep well, are cheap, and being free from alcohol, are convenient and suitable for export.

The following Glycetracts are perfectly miscible with water:—

𝔓1 Glycetract of belladonna.
Glycetract of calumba.
Glycetract of cascara.
Glycetract of chiretta.
Ⓟ Glycetract of conium
Ⓟ Glycetract of digitalis.
Ⓟ Glycetract of gelsemium.
Glycetract of gentian
Glycetract of hamamelis
Ⓟ Glycetract of hyoscyamus.
Ⓟ Glycetract of jaborandi (almost)
Glycetract of quassia.
Glycetract of sarsaparilla.
Glycetract of squill.
Glycetract of senega.
Glycetract of senna.
Glycetract of taraxacum.
Glycetract of valerian.

The following can be rendered miscible, as stated later:—

𝔓1 Glycetract of aconite.
Glycetract of catechu.
Glycetract of cinchona.
𝔅 𝔓1 Glycetract of coca.
Ⓟ Glycetract of colchicum.
𝔓1 Glycetract of ergot.
Ⓟ Glycetract of hydrastis.
Glycetract of krameria.
Glycetract of rhubarb.
Ⓟ Glycetract of Virginian prune.

METHOD OF PREPARATION.

1. **For Drugs containing water - soluble** constituents, bitters, tannin principles, and some flavouring agents:—

(*a*) *Percolation-process.*—For those drugs which will percolate satisfactorily, without "blocking," this method is to be preferred. Macerate 100 of the drug in No. 20 powder in glycerin 50 and water 200 for twenty-four hours, then commence percolation. Reserve the first 50 of percolate and continue percolation with chloroform-water (1 in 1,000) until exhausted. Evaporate the liquor to 50 and add to the reserved portion.

Experiments show that this percolation method is suitable for calumba, cascara (1% of strong solution of ammonia to be added), digitalis, gentian, hamamelis leaves, krameria, rhubarb, sarsaparilla, senega, taraxacum, valerian and Virginian prune bark. Glycetract of Virginian prune is made without heat.

(*b*) *Maceration-process—i.e.*, for drugs which will not percolate satisfactorily. Macerate crushed drug 100 in a hot mixture of glycerin 50 and water 200 for six hours, press off, and repeat maceration with hot water twice. Combine liquors and evaporate to 100.

Experiments show that this is suitable for chiretta, liquorice (cold maceration), quassia, senna (cold maceration), squills (cold maceration).

Glycetract Digitalis (1 = 1).

Dose.—**1 to 2 minims (0·06 to 0·12 Cc.). Wash the powdered leaves 100 thoroughly with Petroleum Ether and dry, then make an extract, strength 1 in 1, from this washed leaf using Glycerin 20 and Absolute Alcohol q.s., to 100. Reserve the first 75 and percolate to exhaustion with Absolute Alcohol add the extractive to the reserve and make up to 100 by volume with the Alcohol. This method improves the Digitoxin content of the preparation and retains also the other constituents. The preparation is fully eight times as active as a strong Digitalis Tincture.**

2. Alkaloidal Drugs.

For drugs containing alkaloids percolate the crushed drug 100, with a mixture of glycerin 50, acetic acid 9, and water 191, and proceed otherwise as under 1 (*a*), making the final product 100 containing about 3 per cent. of acetic acid.

This method our experiments show to be applicable for aconite, belladonna, cinchona, colchicum, conium, ergot, gelsemium, hydrastis hyoscyamus, ipecacuanha and jaborandi. A larger proportion of acid does not yield larger alkaloidal contents.

The acetic glycerin mixture extracts the bulk of the alkaloids in most cases. (Beringer used Tartaric Acid 2%, except for Colchicum, Conium and Ipecacuanha, in which Acetic Acid was used.)

"Glycetracts" which do not mix *clear* with water can be replaced by an aqueous extractive, evaporating and mixing a sufficiency of glycerin with the warm liquor, but alkaloidal drugs must be handled by the method 2.

The following **Glycetracta** are standardised :—

Glycetract	Alkaloidal Strength.	Dose.
[P1] Aconite	0·4 % Alkaloids.	(Average) 1 min
[P1] Belladonna	0·375 "	1 to 2 min.
Cinchona	3·0 "	8 to 25 min.
[D] [P1] Coca	0·25 "	1 to 2 dr.
(P) Colchicum (seeds) ..	0·5 "	(Average) 3 min.
(P) Conium (seeds)	0·45 "	(Average) 3 min.
(P) Digitalis	M.L.D.0·1Cc.per 100 Gm. frog.	1 to 2 minims.
(P) Hyoscyamus	0·075% Alkaloids.	(Average) 3 min.
(P) Ipecacuanha	1·1 "	Expectorant 1 to 4 min. Emetic 30 to 40 min.
[P1] *Nux vomica	0·75% Strychnine.	2 to 6 min.

Fluidglycerate of Buchu is made with Bachu 100 Gm., Potash Solution 50 Cc., Glycerin 50 Cc., Water 100 Cc.

Fluidglycerate of Grindelia is made alkaline on the lines of that of Buchu. See also Beringer who has worked on similar lines. —Am. J l. Ph. 1907,410; 1908,525, 1909,312.

Glycopasta is the name given to a Glycetract (*neutralised if necessary*), made into a paste for local use by mixing with Tragacanth 2 to 3%, *e.g.*, the following :—

[P1] **Glycopasta Belladonnæ** 0·375% Alkaloids. (Glycerinum Belladonnæ *q.v.* is about 0·5% Alkaloids.) [P1] **Glycopasta Aconiti** is the Glycetract alone (no thickening necessary). (P) **Glycopasta Hyoscyami** 0·075% Alkaloids. If considered too strong they should be directed to be diluted with Glycerin.

*GLYL AND *SYL FLAVORING AGENTS (*Martindale*).

Our suggestion is to employ as flavoring agents to prescribed "mixtures," Solutions in either Glycerin or Syrup of pleasant tasting Essential Oils. These are called respectively ***Glyl** (T.M. 320797) and ***Syl** (T.M. 320798) throughout our pages.

These two words are Registered Trade Marks—the property of the authors. We permit *Pharmacists to make the preparations in question for the flavoring of prescribed medicines* The strength and method of preparation to be strictly adhered to as described.

In all other respects the use of the Trade Marks is reserved by the owners, Trade Marks in other portions of the book must be carefully observed.

'Glyl' and 'Syl' Flavoring Agents are stable within ordinary limits of temperature. Their use tends to uniformity and time saving, both in prescribing and in dispensing.

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*This Glycetract is best made with Hydrochloric Acid—the strength employed is 5 Cc. of Hydrochloric Acid Sp. gr. 1·16 to 100 Gm. of drug.

The preparation of the Distilled Waters hitherto employed, entails unnecessary labour, more especially as several, *e.g.* Cinnamon Orange Flower, Rose, have poor keeping qualities. Then again, many of the Aromatic Waters require the addition of either Glycerin or Syrup to render them of use in covering the taste of nauseous medicines. The same applies to Tinctures and Spirits.

Fresh infusions of drugs are useful, but though the infusions are '*fresh*,' the drugs are mostly *dried* and have lost much of their aroma.

Of the usual flavoring tinctures that of Orange is the only one of use to ' cover ' the taste of a nauseous drug, but a sweetening agent in addition is essential. Syrup of Orange by reason of its utility has become hackneyed.

Glyls *and* **Syls** ***have now been well tried and are much prescribed.***

Preparation.—

Glyl and Syl flavorings are all of uniform strength—1 of the Essential Oil in 500 respectively of Glycerin or Syrup—or approximately 1 minim to the ounce, and are quickly prepared by placing **half** the required amount of Glycerin (slightly warmed, *e.g.*, by standing the bottle in a little hot water) or Syrup in a bottle capable of holding the full amount, adding the Essential Oil mixed with three times its volume of 90% Alcohol in small portions with shaking, then adding the remainder of the Glycerin or Syrup with further shaking.

Thus made and allowed to stand a short time for any excess of Essential Oil to rise (easily removed by passing through a pledget of moist Cotton Wool), the following are perfectly clear. The solubility of these Oils in Glycerin is remarkable.

Glyl vel **Syl*** Amygdalæ Amaræ *sine* HCN.
„ „ Anethi.
„ „ Anisi.
„ „ Aurantii Amari.
„ „ Aurantii Floris.
„ „ Carui.
„ „ Caryophylli.
„ „ Cinnamomi.
„ „ *Coriandri
„ „ Fœniculi.
„ „ *Lavandulæ.

Glyl vel **Syl** Limonis.
„ „ *Menthæ Piperitæ.
„ „ „ Viridis.
„ „ Myristicæ.
„ „ Pimentæ.
„ „ Pini Pumilionis.
„ „ *Rosæ.
„ „ Sassafras.
„ „ Thymi.
„ „ *Vanillæ (1 of Essence *q.v.* in 8).

The favorites in the series according to our taste are indicated by*.

Glyl Aurantii Amari, Cinnamomi, Pini (excellent for Terebinthinous drugs), and Thymi are also good,

Glyl Pini and Syl Lavandulæ together is a useful combination.

Dose.—Of either Glyl or Syl, to flavor an ounce dose of a mixture, 1 to 2 drachms, as a general rule, suffices. In the case of Glyl or Syl Menthæ Piperitæ ½ drachm will be ample.

Glyls act as preservatives—both Essential Oils and Glycerin are antiseptics.

E. O. Rowland suggested Glycerins of Lemon and Orange Peel made from fresh peel. C.D. i./14,594.

GOSSYPIUM.—*Syn.* Cotton Wool.

With data on Cellulose Products.

The hairs of the seeds of *Gossypium Barbadense* and of other species of gossypium, freed from fatty matter, employed as a wound dressing.
Manufacture of Cotton.—The bleaching solution may be made by dissolving 5 cwt. of 35% Chlorinated Lime in 600 gallons of water and allowing it to settle. One gallon of this solution with twenty gallons of water is considered strong enough for use. The bleaching solution is allowed to act for several hours. After removing the bleach liquor the cotton is soured and washed to get rid of lime and chlorine. The acids used for souring may be either sulphuric or hydrochloric. For washing, the softest water is used. After washing, the cotton is soaped and again washed and the cotton finally treated with a little Tartaric Acid. This imparts crispness—a characteristic in demand. For details of machinery required see A. W. Gerrard, P.J.i./16,573.

Cotton Wool is soluble in an ammoniacal solution of copper oxide.

The following surgical forms of **Cotton Wool** (and Allied Dressings) are in use. *See also* under the individual antiseptics for medicated preparations.

Bandages.

- Black Cloth, 6 yards, 1½, 2, 2½, and 3 inches are prepared for use as slings.
- Buttercloth, 1, 1½, 2, 2½, 3, 4, and 6 inches (6 yards).
- Calico, 1, 2, 2½, 3, 4, and 6 inches (6 yards).
- "Cataract" (of special form for bandaging after operation for).
- Crepe, Geneva, 1½, 2, 2½, and 3 inches wide and 8 inch binders.
- ,, Velpeau, 2, 2½, and 3½ inches wide.
- Crinoline, for silicating and Plaster of Paris, 1, 2, 3 and 4 inches wide.
- Domette, 2, 2½, 3, 4, 5, and 6 inches wide.
- Elastic Circular Stocking, 2½, 3, and 4 inches (any length).
- Elastic, India Rubber Webbing, 1, 2, and 3 inches wide.
- Flannel, 2½, 3, 4, and 5 inches wide.
- Gauze, Plain, Absorbent, 4 inches wide.
- "Ideal" (a special elastic bandage) 2½ and 3 inches wide.
- Muslin, Check, for Plaster of Paris, 2, 3, and 6 inches wide.
- Open Wove, white absorbent, 1, 1½, 2, 2½, 3, 4, 5, and 6 inches wide.
- Plaster of Paris, 2, 2½, and 3 inches wide. In air-tight containers.
- Selvedge, white and grey, 2, 2½, 3, and 3½ inches wide.
- Stockinette.—See Elastic Circular Stocking above.
- **Triangular Splint.**

Battist, Milne's. A substitute for oiled silk, guttapercha tissue, and jaconet. Can be boiled, and is spirit and greaseproof.

Billroth's Cambric.—Cotton fabric treated by a special process. It takes the place of Gutta Percha Tissue and Oiled Silk, being sterilisable.

Buttercloth.—As a dressing for applying ointments, liniments, &c.

Cellulose Film in three varieties.—

'Taffetas.'—A yellow film similar in texture to Yellow Oiled Silk and suggested as a substitute for same. It is perfectly *greaseproof* but swells slightly in contact with moisture, hence though suitable for use with Soft Paraffin basis ointments is not intended for applying dressings containing aqueous medicaments. It is nevertheless sterilisable by moist heat.

'Aseptafilm.'—This modification is colourless and being transparent and sterilisable may be applied direct to wounds.

Cellophane '(Cellafine.)'—This variety is the thinnest and is used as a greaseproof covering for packing pharmaceutical and food products.

All the above are unaffected by Alcohol and Ether, but they expand in contact with moisture—contracting again on drying—in some cases this property is of distinct value.

Cellulose Wadding.—A cheap absorbent dressing. Is prepared from wood fibre. **Cellulose Wadding is in sheet form.**

Eye Pads are ready cut, round or oval, consisting of a layer of wool between two sheets of gauze

Felt, thick, coated with adhesive solution, in sheets 28 inches by 18 inches and with soap plaster for bed sores.

Gauze Tissue, see Gauze and Wool Tissue.

Gauze, White Absorbent, is prepared in 6 yard pieces. Tela Depurata, P.G is similar.

Gauze and Wool Tissue, plain and medicated with Boric Acid, Carbolic Acid, Iodoform, Ⓟ Mercuric Iodide, $\boxed{\text{P1}}$ Mercuro-Zinc Cyanide, Thymol, Picric Acid, are prepared

Gauzes, Ribbon, as suggested by C. Stonham, have a woven edge and are used for plugging cavities and wounds.

The following are made in ¼, ½, 1 and 2 inch widths, in 12 yard lengths :—**Alembroth, Aluminium Acetate, Boric Acid, Carbolic Acid, Iodoform,** $\boxed{\text{P1}}$ Mercuro-Zinc Cyanide, Ⓟ Mercuric Perchloride, also Non-Medicated.

Gauze Tampons, 3 inches long and ¾ to 1 inch in diameter (with thread attached), coated with soft soap, useful in obstinate constipation. Evacuation occurs in ¼ hour.

Handkerchiefs, Aseptic (Silky Fibre), are medicated with Eucalyptus and Pine Oil, and Non-Medicated.—For phthisical sufferers.

Impermeable Piline.—⅓ the thickness of spongio-piline or felt, and instead of the waterproof indiarubber backing of the former, there is an antiseptic material, not affected by heat or strong spirit. For applying liniments in rheumatism, and where warmth is desired simultaneously.

Jute, in 1 lb. rolls for rough absorbent purposes.

Kapok Wool strongly advised as wound dressing. Useful absorbent of discharges.—B.M.J. i./18, 276.

Sheep's Wool. *Syn.* **THERMO-LAINE. Antiseptic for tampons. As a treatment for prolapse of the uterus; applied every day by the patient. Does not absorb fluids and maintains size and gives support. May be impregnated with mercuric biniodide 1 in 10,000.**

Has many advantages over Cotton Wool, *e.g.*, **in the use of a gamgee jacket. Cotton prevents the escape of moisture. In prolonged operative** work the long anæsthesia lowers body temperature. A wrap of sheep's wool would be preferable to Gamgee Tissue. Other uses, *e.g.*, rheumatism, pulmonary affections, suggest themselves.

Sheep's wool not only kills fleas but has no attraction at all for them.—P. Delanoe, per Jl. Trop. Med., July 2/23,327.

Lint (*vide also* Steriloid Dressings), absorbent, is made both non-medicated and medicated :—Boric, 50% coloured pink. Iodoform, 10%. Non-**Absorbent useful for local use. Styptic (10% Ferric Perchloride).**

Linteum Carptum L.H. is plain absorbent lint.

Muslin, Nainsook, width 36 inches. Somewhat softer than buttercloth. Is useful for ointments.

***Pontampons** (T.M. 307382) consist of a semi-solid slowly soluble medicated cone with a non-absorbent wool tampon attached—the whole encased in a gelatin shell. On introduction into the vagina the gelatin shell disintegrates; the wool tampon expands, carrying the medicated cone upward against the cervix, thus affording a continuous application to the mucous membrane of the vaginal tract.

Not only are the vaginal folds distended, thus assuring complete medication, but the Tampon supports the uterus, thus relieving the venous congestion, thereby correcting displacements.

For the treatment of gonorrhœa, endometritis, cervicitis, vaginitis, leucorrhœa, dysmenorrhœa, prolapsus uteri. The following are made :—

(A). Ⓟ Ichthyol Compound—*i.e.*, Ichthyol 2·5%, Iodine 0·14% Carbolic Acid 0·5%, Powdered Hydrastis 1%. (B). Ichthyol 10%. (C). Protargol and Ichthyol, each 2%. (D). Ⓟ Opium and Hyoscyamus of each 2 grains, Belladonna 1 grain. All these are made with a Boroglyceride basis.

Sanitary Towels, Hygienic, for menstruation, of Sphagnum (*q.v.*) are absorptive, deodorant and antiputrescent. Southall's, Nos. 0, 1, 2, 3, 4 and extra large, and the " Mene " are of cotton fabric. Maw's are in two brands, 'ordinary' and 'superfine.'

***Kotex (T M. 426020, Cl. 11) Sanitary Pads** are described as made of Cellucotton Wadding of high absorbency.

Sponges, Carbolised, have fallen into disuse but some surgeons still prefer them to cotton swabs. They are available thin and flat and can be kept in 1 in 20 Carbolic Solution. More suitable than gauze for soaking up blood.

Sponge Eduction.—In the treatment of cases of laceration of the finger in which a bare and protruding bone or extensive stripping of the skin with denudation of the deeper parts may render amputation necessary. The method makes it possible in most cases to save the full length of the stump. Flat Turkey Sponge is used, soaked in 1 in 40 Carbolic Solution before the operation. For details of methods *vide* L. ii./11.1348.

Circular Gauze and **Wool** pads, about 3 inches in diameter. Also sterilised (*vide* Steriloid Dressings).

Spongio-Piline.—Thick felt with waterproof india-rubber backing for applying warm moist dressings.

Tillman's Dressing is Cellulose Wadding *q.v.*

Tow, **Flax**, *cf.* **Tenax.**

Wool, Absorbent Cotton (also non-absorbent).

Both the above also in thin sheets measuring 20 by 14 inches.

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* "Steriloid" Dressings. (T.M. 260647).

These dressings have been submitted to a temperature of 250° F. for 30 minutes at a pressure of 15 lbs. in an autoclave Each parcel of dressing is wrapped by a patent method in wool, parchment wrapper, and enclosed in an air-tight dustproof carton or hermetically sealed tin.

Bandages (in tins), 2, 2½, 3 and 4 inch.
Gauze, plain, absorbent. 1. 2, 6, and 12 yard cartons.
,, **Alembroth** and **Boric,** each 1 and 2 yards.
P1 ,, **Cyanide,** 1, 2, 6, and 12 yard cartons.
Ⓟ ,, **Biniodide,** 6 yards
Lint, plain, absorbent, **Alembroth**, **Boric,** and P1 **Cyanide.**
Wool, plain, absorbent, 1, 2, and 8 oz. cartons
,, **Alembroth, Boric,** and P1 **Cyanide,** in 1 and 2 oz. cartons.
P1 **Swabs, Cyanide.** Gauze, 4 × 4 inches, 12 in carton

In addition, **Iodoform Gauze** (2 yards) and **Carbolised Wool,** 50, 100, and 250 Gm. are wrapped with aseptic precautions in similar cartons, but are not heated

Combined cartons contain 1 ounce of plain absorbent wool with ½ yard plain absorbent gauze sufficient for a minor dressing, and combined cartons containing Alembroth Gauze (6 yards) with wool and gauze tissue suitable for a major operation

Swabs, cartons contain: 12 small round pads suitable for eye-work; 6 larger round pads (about 2 inches in diameter); 12 gauze, 6 inches square; 12 wool and gauze tissue pads, 3 inches square; **tins** contain 10 gauze covered swabs, 4 inches square; also **tins** containing 10 swabs 6 inches square (*vide* also Triangular Swabs).

P1 **Swabs, Cyanide,** 12 in carton, 4 inches square.

Triangular Swabs have a pocket at one angle in which the finger or a probe can be introduced. For packing a cavity or wound during operation. In tins of 10 and 20 swabs.—Jackson Clarke.

Eye Pads, 1 doz. in carton; **Towels** (Tins of 4), 18 × 32 inch.

Wrappers 6 feet long with slit in same, 10 × 2 inches, for abdominal operations, also 3½ feet long.

Abdominal Set in flat tin with key, contains 12 swabs 6 × 8 with tapes, 12 swabs 6 × 6, with tapes, 4 towels, 32 × 18 inches, 2 thick pads 6½ × 8½ inches (as dressing), with 6 safety pins, 1 bandage 4 inch × 6 yards, 2 wrappers with sleeves, twelve 4 inch × 3 yard gauze rolls and 2 veils.

Eye Operation Set, No. 1, tin containing 3 Sterile Sets of the following:—12 small eye swabs, 1 special eye pad, 1 × 2½ inch bandage. (A set can be removed without impairing the others in any way.)

Eye Operation Set, No. 2, containing 1 × 2 inch bandage, 4 eye pads, 4 pieces gauze, 1 oz. wool.

Preparation of Medicated Sterilised Dressings.

The following notes are based on a paper by Beringer some years ago, and experience of our own in this class of work.

Specially cleansed rooms are of course required for work of this kind. All tables, floors, etc., should be scrupulously scrubbed with soap and Cresylic Disinfectant. The tables just prior to use should be washed down with 1 in 500 Perchloride Solution and then may well be covered with sheets of freshly sterilised parchment paper. Operators' hands, clothing, etc., require usual attention. Cartons, tins, wrapping paper, etc., should be heated in an oven at 120–150° C. for half an hour.

Absorbent Gauze.

The gauze suitable for use contains about 12 threads to the Cm., both on the woof and on the warp and is about 1 yard wide. This is wrapped and sterilised in convenient lengths for surgeons' use.

Moist Absorbent Gauze.

Sprinkle the Sterile gauze with Sterilised Distilled water containing 5% Glycerin and pack in previously sterilised amber glass jars and sterilise again.

Boric Acid Gauze, 20% (Usually colored pink.)

Impregnate Gauze 100 with boiling Saturated Solution of Boric Acid tinted with magenta. Press out until it weighs 180 and dry.

Carbolised Gauze, 5%.

For this employ Phenol 5, Acetone 50, Water 50, Glycerin 5, to Gauze 100 as under Iodoform Gauze. (Dry).

Iodoform Gauze, 10% (Dry).

Dissolve Iodoform 10 in Acetone 100, saturate Sterile Gauze 100 with the solution, evaporate the Acetone.

Iodoform Gauze, 10% (Moist).

Proceed as for Iodoform Gauze (dry) incorporating about 1% Glycerin in the Acetone solution.

Ⓟ **Mercuric Iodide Gauze 4%.**

Impregnate Gauze 400 under pressure with a solution of Mercuric Iodide 1 and Potassium Iodide 1, in Water 800. Less Liquid, *e.g.*, Water 400 will work equally well by adjusting the pressure. We have also employed for this quantity a mixture of Acetone 200 and Water 200.

$\boxed{\text{P1}}$ **Mercuro-Zinc Cyanide Gauze 3%.**

Prepare a suspension of Mercuro-Zinc Cyanide 3 in Sterile Distilled Water 600 tinted with rosaniline and mix evenly by stirring or shaking with Gauze 100. **Dry without pressing. Much more water is required than usually advised.**

Picric Acid Gauze 2%.

Picric Acid 2, Water and Acetone of each 50, Gauze 100.
Proceed as under Dry Iodoform Gauze.

Sal Alembroth Gauze 1%.

Impregnate Gauze 100 under pressure with a solution of Sal Alembroth 1 in Water 200 tinted with Anilin Blue. Less water may be used or a mixture of Acetone and Water, *e.g.*, Acetone 50 and Water 50.

Thymol Iodide Gauze 5%.

Dissolve Thymol Iodide 5 in Chloroform 25 and add Acetone 50. This quantity is suitable for 100 Gm. of Gauze.

All Gauzes should be sterilised at 120° to 150° C. for half an hour just before medicating.

If a steriliser be available—*cf.* Chapter on Sterilisation, a less temperature *e.g.*, 120° C. will be sufficient, furthermore the use of a vacuum apparatus will permit of excess of moisture being drawn off rapidly.

The preparation of **Wools,** and **Gauze and Wool Tissues** is on similar lines. We give brief notes of procedure under respective headings, *e.g.*, **Gossypium Carbolisatum, Gossypium Ferri Perchloridi, Gossypium Sal Alembroth, etc.**

National Health Insurance requires the dressing to be issued to the patient wrapped in dust-proof casing.

Dental Dressings.

For Dental use are prepared —

Aseptic Dental Napkins to be used once and thrown away.

Absorbent **Dental Rolls.** As a substitute for the napkin or rubber dam. For covering the mouths of the salivary ducts, a section may be placed on either side of a tooth, or the entire roll may be bent round the outside of the arch or under the tongue. No. 1, diameter $\frac{5}{16}$ inch; No. 2, $\frac{3}{8}$ inch; No. 3, $\frac{1}{2}$ inch; No 4, $\frac{5}{8}$ inch; in $1\frac{1}{2}$ or 6 inch lengths.

Non-absorbent **Dental Rolls**—To replace the rubber dam. In crown and bridge work. May be used in connection with the saliva ejector.

Sterilised Absorbent **Pledgets** for wiping out cavities.

Aseptic Absorbent Points are prepared for drying pulp canals.

Sterilised Bibulous Paper, in sheets, 3 inches by 10 inches.

Carbonised Cotton for filling pulp canals, and for treatment of exposed pulps.

Artificial Silk. *Syn.* RAYON.

In Coventry an industry has been established more revolutionary by far than the ousting of the horse by motor-cars—the artificial silk industry of Courtaulds, Ltd., which, in the early years of the present century started in that city. The task of producing synthetically a fibre with the physical characteristics of natural silk was engaging the attention of scientists of all countries, and the titanic struggle against disappointments and the task of sponsoring its adoption in the weaving trades would be a long story to tell, and one which reflects great honour on these British pioneers. To-day the small original factory in Foleshill Road is submerged in huge works covering thirty acres. In the Coventry factory alone are employed about 5,000 workpeople, and at Nuneaton two-thirds of this number. There are yet other factories in North Wales and in Wolverhampton, growing sturdily to the dimensions of the parent, whilst in the United States the Viscose Company (an enterprise launched and controlled by Courtaulds) has a production of nearly double the English undertaking. Besides these, there are factories in Canada and France, and processing works in India, Denmark, and Spain, all of which are branches of a plant the seed of which germinated in the "City of the Three Spires." Coventry-made artificial silk is used in the new commercial undertakings of S. America, in the ancient hand-looms of the Orientals in India, and in Australia.—Lond. Cham. Com. Jl., Oct. 22/26.

Manufacture of Artificial Silk.

The first process involves the separation of Cellulose from other constituents of Wood Pulp or Cotton by boiling in 5% Caustic Soda, washing with water, straining and bleaching with Sodium Hypochlorite, again washing, drying, and cutting into suitable sheets.

There are four methods of commercial importance by which the dried pulp sheets are treated :—

(1) **Nitro-cellulose** (Chardonnet or Swan Artificial Silk), made by dissolving the cotton linters in a mixture of Nitric and Sulphuric Acid, pressing off, washing, and partially drying. The Nitro-cellulose is then dissolved in an Alcohol-Ether mixture, filtered and stored for use.

(2) **Cuprammonium** (Despeissis or Pauly Artificial Silk). The purified Cotton is here dissolved in Schweitzer's Reagent and allowed to ripen at a low temperature for several days.

(3) **Viscose Artificial Silk** (Cross, Bevan and Beadle), generally Xanthate of Cellulose. This constitutes the greater percentage of Artificial Silk, and is prepared by impregnating the purified wood pulp with Caustic Soda solution. The excess is removed and the Alkali-Cellulose treated with Carbon Disulphide. After 3 to 5 hours the product is dissolved in water and weak Caustic Soda solution and agitated in a mixer until homogeneous. This is termed xanthation and the product named **Viscose.** After repeated filtrations the Viscose in large vertical containers is then allowed to ripen. In the spinning, the viscous solution is forced through fine jets and coagulated in acid, fine filaments resulting.

Cross, Bevan and Beadle's Patent is 8700/92. The patent was prolonged for five years.—S. W. Woolley. 'Enemy Patents and Trade Marks,' Oct. 24/18.

(4) **Cellulose Acetate, 'Celanese.'**—The purified raw material (almost invariably cotton) is here acetylated by Acetic Anhydride in the presence of a catalyst, usually Sulphuric Acid. The Cellulose Acetate formed is precipitated with water, and the substance then dissolved in Acetone, or in a mixture of organic solvents. The product is filtered and stored. (Coagulation here is done by warm air evaporating the solvent.)

In each instance the thick solution is drawn out into thin threads by forcing through fine jets or multiple-spinning nozzles, the orifices of which are considerably less than 0·1 mm.—Artificial Silk, its Manufacture and Uses.—T. Woodhouse, 1927. See also U.S.D., p. 533.

Genuine Silk contains 17% Nitrogen, whilst Artificial Silk derived from Cellulose contains only 0·05 to 0·13%. That obtained from proteids, *e.g.*, Casein, Gelatin, etc., more.—Thorpe, Vol. IV., 686.

Tests for Silk.

One of the simplest tests is to apply a match—pure Silk is distinctly difficult to set alight and leaves a relatively large Carbon ash, whilst Artificial Silks catch on fire easily and leave little ash. *Mixtures* of Artificial and Natural Silk with wool and cotton, are used. A mixture of Artificial and real Silk responds according to the proportions. Those in the trade can tell almost by touch and the flame test the composition of a material. It is customary in some cases to 'load' the materials with chemicals, *e.g.*, tin, to make them weigh to the touch like real silk.

Silk is soluble in Richardson's solution (warm), concentrated aqueous Zinc Chloride, and in Elsner's Reagent. It is also soluble in 5% boiling Sodium Hydroxide Solution.

Richardson's Solution.—Nickel Sulphate 25 Gm., is dissolved in water and precipitated with a slight excess of Sodium Hydroxide. The precipitated Nickel Hydroxide is filtered off, washed thoroughly, dissolved in 125 Cc. Strong Ammonia Solution and diluted to 250 Cc.

Elsner's Reagent.—Dissolve Zinc Chloride 100 Gm. in water 85 Cc. and add Zinc Oxide 4 Gm. Boiling, this will dissolve Silk, but not cotton or wool. Chlorine will decompose Silk, and, when wet, Ozone will attack it.

Tests to distinguish the varieties of Artificial Silk.

The tests apply essentially to the untreated Rayon. Great care must be exercised in interpreting reactions obtained with dyed fabrics, since the presence of aniline colours, mordants, and other fibres, such as cotton or real silk, may give anomalous results.

TESTS.	Cellulose Acetate Silk.	Nitro-cellulose Silk.	Viscose Silk	Cuprammonium Silk.
Solution in boiling 5% Caustic Soda	insoluble	almost insoluble	insoluble	insoluble
Solution in Glacial Acetic Acid	soluble	insoluble	insoluble	insoluble
Solution in Acetone	soluble	insoluble	insoluble	insoluble
Diphenylamine in conc. H_2SO_4	no blue colour	blue colour	no blue colour	no blue colour
Schweitzer's Reagent	almost insoluble	almost insoluble	readily soluble	readily soluble
Cover with conc. Sulphuric Acid, observe:				
(*a*) At once	yellow	colourless	reddish-brown	yellow
(*b*) After one hour	pale brown	pale yellow	dark brown	brown
Soak in an aqueous solution of Ruthenium Red (1 : 1,000 for 12 hours) and then wash.	remains undyed	dyed deep magenta	dyed a pale magenta colour	coloured irregularly pale pink and blue tints

By carrying out the tests in the order given it is possible by a process of elimination to identify an undyed artificial silk fibre. The insolubility in 5% Caustic Soda distinguishes from real silk.

As confirmation for **real silk**—

Acidify a solution of Sodium Nitrite with Hydrochloric Acid, producing Nitrous Acid and soak the sample for some hours in the dilute solution, then rinse well and put into a solution of β-naphthol in dilute Sodium Hydroxide. True Silk gradually becomes maroon in colour and Artificial Silk remains undyed. This may be of value in mixtures of Silk and Artificial Silk.

CELLULOSE ACETATE AND CELLULOSE NITRATE SOLVENTS

The principal solvents for Cellulose Acetate are Acetone, Methyl and Ethyl Formates, Methyl Acetate, Aniline, the Phenols, Pyridine, Quinoline, Cyclohexane, Methyl Ethyl Ketone, Acetaldehyde, Benzaldehyde, Nitromethane, Glycerin esters, Mono-, Di-, and Tri-chlorhydrins, Glycol Diacetin, Benzyl Acetate, Furfural. It is insoluble in Methyl, Ethyl, Butyl and Isopropyl Alcohols, and in Carbon Tetrachloride.

The solubility in Tetrachlorethane is approximately 1·5%, but the addition of solvents such as Benzyl Alcohol, Methyl Alcohol, etc., give solutions which contain up to 5% of the Cellulose Acetate and yield an elastic film on evaporation. Such solvents are termed **plasticisers** and softeners.

Many of these Cellulose paints and varnishes are now made and applied to the surfaces *hot* by means of sprays. It is necessary to use a volatile solvent for solution, with a very small percentage of a high-boiling plasticiser added. A list of these plasticisers was published in the Chemical Trade Journal and Chemical Engineer of March 11th, 1927. Plasticisers between the B.Pt. range 160° to 250° C. should be avoided or an even wider range might be adopted.

Amyl Phthalate.—B.Pt. 340° C. This seems to be one of the most satisfactory plasticisers. It is a good solvent for Nitrocellulose, resins and 'ester gum.' The amount added varies from 10% to 100% of the Nitrocellulose employed, with the addition of 3% to 5% of ester gum. Hard resins up to 15% might be added with advantage. This gives a stable, weatherproof, elastic film.

Benzyl Alcohol.—B.Pt. 200° C. This is used as a softener. It causes the Cellulose Acetate or Nitrocellulose to swell and soften into a jelly which then readily dissolves in the commoner solvents. This is used in many of the so-called stove enamels. It should be used in conjunction with a high-boiling plasticiser and a low-boiling solvent. It prevents cracking of the film. The solubility of Cellulose Acetate in Benzyl Alcohol alone is only 1%, cold.

Tricresyl Phosphate.—B.Pt. 430° C. This is probably the best of all plasticisers. It reduces inflammability and, in conjunction with ester gum produces a film of high brilliancy and elasticity. Its advantages are great permanency and its capability of giving a highly-polished surface.

Camphor is not now generally used. It is not a satisfactory plasticiser, as it readily volatilises and leaves a brittle film which tends to shrink. Moreover, raw Camphor is a non-British product and subject to monopoly.

Castor Oil can only be used in very small proportions, as it tends to produce a sticky non-drying film. It is a non-solvent for Nitrocellulose and Cellulose Acetate.

Tetrachlorethane.—B.Pt. 144° C. A good solvent, used considerably in the Cellulose paint and lacquer industry. A solution of Cellulose Acetate 5 Gm., Methyl Alcohol (good quality) 5 Gm., in Tetrachlorethane 100 Gm., gives a film which is bright, clear, and flexible. The solution evaporates in one hour. A good film can be obtained from a 2% solution of Cellulose Acetate, with 5% Benzyl Alcohol in Tetrachlorethane, but owing to the dilution of the solution the film is weak and thin.

Ethyl Acetate.—B.Pt. 88° C. Not a good solvent for Cellulose Acetate, but it dissolves Nitrocellulose more readily. The addition of 3% ester gum to a solution of 5% Nitrocellulose in Ethyl Acetate gives a film which is hard and bright, but has a somewhat crinkled appearance. A mixture of Ethyl Acetate with 4 or 5% Ethyl Alcohol gives a better solvent for the Acetate. Also equal parts Methyl or Ethyl Alcohol with Benzine (this is only satisfactory when warm).

A mixture of Trichlorethylene and Methyl Alcohol equal parts has a remarkable swelling effect upon Cellulose Acetate, whilst an addition of a small quantity of any other solvent causes complete solution.

Cellulose Formate.—Brit. Pat. 260,650 of 1926.

The ester may be obtained by treating Cellulose, Hydrocellulose, or Mercerised Cotton with a concentrated Formic Acid and a catalyst at a temperature not above 5° C. A mixed ester is obtained from this by treatment with Acetic Anhydride and Acetyl Chloride. The mixed ester may be spun directly or coagulated in a spinning-bath as Artificial Silk. The mixed ester may be used in the lacquer industry, but is more expensive than the Acetate.

Inflammability Experiments.

Additions of 5%, and 10% Hexachlorethane to Benzol or Amyl Alcohol, do not affect the inflammability. Either solvent readily burns, whilst the Benzol mixture is ignited by a spark. A Celluloid enamel on the market has as solvents Benzol and Amyl Acetate. It has a residue of 25% which burns very slowly and with an odour of resin. The percentage of Cellulose in this enamel must be very small. Its rapidity of drying is no quicker than that of a Cellulose Acetate solution in Tetrachlorethane, and it is highly inflammable.

Solvent Mixtures of Tetrachlorethane with various percentages of Amyl Phthalate, Benzyl Alcohol, Tricresyl Phosphate, etc., as above detailed, may be used for Cellulose Acetate with, in addition, small percentages of Resin or Canada Balsam for application in the arts. Experiments on the above subjects were recently conducted in the author's laboratories.

The fabric of the **planes of aeroplanes** is treated with Solutions of Cellulose Acetate. It is water resisting and renders the planes taut. The acetate acts as a preservative. It is combustible but not explosive.—C. F. Cross, C.D. i./17,252.

Dope.—The name given to a solution of Cellulose Acetate or Celluloid in Tetrachlorethane with Amyl Alcohol and Benzene. Poisoning from inhalation of fumes of.—See W. H. Willcox, L. i./15,544, also W. E. Lee, L. i./16,24.

Viscose.—Development as used for capping bottles, etc.—C. F. Cross C.D. i./17,252.

Acetyl artificial silk is more transparent than protein products, such as silk or wool, to Ultra-Violet light.—L. Hill, B.M.J., ii./25,473.

GOSSYPII RADICIS CORTEX.

The root bark from *Gossypium herbaceum* (*Malvaceæ*) and other cultivated species is *B.P.* '14. It contains about 10% acid resin.

Chemical Examination of the bark.—F. B. Power, P.J. ii./14,420.

Uses.—The following are given instead of Ergot to check uterine hæmorrhage in all its forms. May relieve dysmenorrhœa.

Extractum Gossypii Radicis Corticis.—Semi-alcoholic.

Dose.—1 to 4 grains (0·06 to 0·25 Gm.) in pill.

℞1 Pilula Gossypii Composita.

Extract of Cotton Root, Extract of Hydrastis, Ergotin, of each 1 grain. *Dose.*—One, 3 or 4 times a day.

Extractum Gossypii Radicis Corticis Liquidum, *B.P.* '14.

Dose.—½ to 1 drachm. The bark exhausted with a mixture of Glycerin 1, Alcohol (90%) 3; 1=1.

Flavoring.—Syl Lavandulæ, Glyl or Syl Cinnamomi.

Extractum Gossypii Seminis Pulverisatum. Powdered Cotton Seed Extract. *Syn.* ✱Lactagol (T.M 252851).

Dose.—1 teaspoonful 4 or 5 times daily given in milk.

Said to increase the flow of milk and the nitrogenous constituents of same.

According to the *Lancet* analysis it appears to consist practically entirely of protein substance, the total Nitrogen amounting to 15·68%.—L. ii./12,702.

Edestine. Stated to be the active principle, so far as galactogogue action is concerned, of cotton seed freed from fat, etc.—L. i./12,830.

Effect of *Edestine* on mammary secretion. Rat experiments. It is a good protein sparer and improves growth, but in large proportion (*e.g.* 46%) the young die.—G. A. Hartwell, L. i./22,323.

Edestine is also obtainable from *Linseed* by precipitation with water from a 4% Saline Extractive. *Vide* also Vol. II. Peptic Index.

Tinctura Gossypii Radicis.

Dried bark of Root of Cotton Plant 1, Alcohol 60% 4.

Dose.—1 drachm (4 Cc.) three times a day.

GRINDELIA (*B.P.* 14.).

The dried leaves and flowering tops of the 'Gum Plant,' *Grindelia Camporum.* The involucre, and often the leaves, are coated with oleo-resin. The medicinal action is due to resins.

Uses.—For the spasmodic attacks which occur in asthma, whooping-cough, and bronchitis, and given in heart disease to slow and regulate the pulse.

Extractum Grindeliæ (by alcohol extraction).

Dose.—2 to 3 grains (**0·12 to 0·2 Gm.**) three times a day.

Extractum Grindeliæ Liquidum, (*B.P.* '14).

Exhaust herb with alcohol (90%), distil, add Sodium Bicarbonate to residue and water *q.s.* with alcohol (90%) one fourth to make 1 = 1.

Dose.—10 to 20 minims (**0·6 to 1·2 Cc.**) at the onset of a paroxysm of asthma, repeated every hour, in sweetened water or milk.

Flavoring.—Syl Pini (very good), Syl Lavandulæ.

Spiritus Grindeliæ Compositus.

Dose.—1 to 2 drachms (**4 to 8 Cc.**) in water every two to four hours while attack of asthma lasts.

Liquid Extract of Grindelia 15 minims, Sodium Iodide 2 grains, Nitroglycerin Solution ½ minim, Tincture of Euphorbia Pilulifera 20 minims, Spirit of Chloroform to 1 drachm.

Extractum Grindeliæ Compositum.

Dose.—1 drachm (**4 Cc.**) with a small quantity of Spirit, *e.g.*, 2 drachms of Brandy in ½ tumbler of hot water.

Liquid Extracts of Grindelia, Chekan and Yerba Santa each 1, Liquid Extract of Quebracho 3. Suggested for use in asthma.

GRINDELINE. *Dose.*—1 to 2 drachms in water every 2 to 4 hours. A speciality containing Liquid Extract of Grindelia 15 minims, Potassium Iodide 2 grains, Trinitrin $\frac{1}{200}$ grain, Tincture of Euphorbia **pilulifera** 20 minims in each drachm.

GUAIACI RESINA.

The resin (a constituent to the extent of about 20%) obtained from *Guaiacum officinale* or from *Guaiacum sanctum* (*Zygophyllaceæ*). The resin contains chiefly (amorphous) Guaiaconic Acid and other constituents. The heart wood of these trees is **Guaiaci Lignum** *B.P.* **'14.**

Dose.—5 to 15 grains (**0·3 to 1·0 Gm.**).

Soluble almost completely in ether, chloroform, absolute alcohol and in sal volatile.

Petroleum Benzine Solution 1 in 5, should be colourless and not turned green by equal volume Cupric Acetate 1 in 1,000—absence of Resin.

Uses.—In chronic rheumatism and lumbago, and for chronic sore throats; added to purgatives is useful in gouty persons, and for sluggish liver. It is a laxative in itself.

For dysmenorrhœa, it is given in cachets 10 grains, of the resin three times a day. If this causes flatulence or colicky pain, add to each dose 1 grain of Dover's Powder. The patient should begin taking it a week before the period.

It is also given to relieve amenorrhœa.

Capsules and Slipules (No. 1) of Guaiacum Resin, 5 grains; also Tablets of Guaiacum Resin and Sulphur 3 grains (0·2 Gm.) of each. Useful for gout and rheumatism, *cf.* **Chelsea Pensioner.**

Elixir Guaiaci.—*Dose.*—1 to 2 drachms. Guaiacum Resin 10, Tragacanth 1, Acacia 1, Syl Pini 50, Simple Elixir to 400.

Suggested for use in acute tonsillitis.

Tinctura Guaiaci Ammoniata (*B.P.* '14).

Dose.—½ to 1 drachm.

One of Resin in 5 of Ammonia-Alcohol Solvent, with Oil of Lemon and Oil of Nutmeg as flavourings.

Flavoring.—Syl Pini; Syrupus Zingiberis.

This is very useful where the uvula and fauces are enlarged.

Tinctura Guaiaci. *Dose.*—1 drachm. 1 in 5 alcohol (90%).

Trochisci Guaiaci Resinæ (*B.P.* '14). Three grains of Guaiacum Resin with fruit basis.

GUAIACOL (*B.P.* '14).

$C_6H_4.OCH_3.OH = 124{\cdot}064$.

Dose.—**1 to 5 minims (0·06 to 0·3 Cc.).** U.S. X. has *average dose* 8 minims. This approximates the *max single dose* of the Fr. Cx.

A colourless refractive liquid, a constituent of Beech-wood Creosote but is also made synthetically from Pyrocatechin, in colourless crystals, melting at about 28° C. Sp. Gr. 1·116 to 1·14. *The crystals should be only dispensed when so ordered.* The crystals are official in **P. Belg.** and **Ph. Ned. V.**

Solubility.—Both forms are soluble in Alcohol, Ether Oils, Glycerin, slightly in water, with taste and odour resembling Creosote.

Uses.—In phthisis, particularly in incipient stages, may be prescribed in capsules (Guaiacol Carbonate), or cordial, *e.g.*, Guaiacol 13·5, Tincture of Gentian 30, Alcohol (90%) 250, and Sherry to 1,000; two teaspoonsful two or three times a day in water—or as Mistura Guaiacol, *vide postea.*

Antiseptic and antipyretic. It is sometimes rubbed into or painted on the skin, covered by oiled silk; begin with 10 minims and increase to 30 or more; do not cover more than the space of the palm of the hand at a time.

Mistura Guaiacol, G.H.

Guaiacol 4 minims, Alcohol 5 minims, Glycerin 30 minims, Cinnamon Oil 1 minim, Tragacanth Mucilage 1 drachm, Water to 1 ounce.

Mistura Guaiacol cum Quinina.

Dose.—½ drachm gradually increased to 2 drachms, well diluted with water, thrice daily after meals.

Guaiacol 30 to 40 minims, Quinine Hydrochloride 20 to 25 grains, Alcohol (90%) 2 ounces, Compound Tincture of Gentian 3 ounces, Water to 8 ounces. The small dose of Guaiacol thus given is increased by giving Guaiacol Carbonate in Capsules.

Pulmonary tuberculosis is treated with Guaiacol, *e.g.*: Guaiacol 1 drachm, Alcohol (90%) 1 ounce, Syrup of Lemons 1 drachm, Spirit of Chloroform 2 drachms, Water to 6 ounces.

Dose.—½ ounce thrice daily. Increase Guaiacol by 2 minims each week until a dose of 12 to 15 minims is given thrice daily, and continue for four months or more.

Perles of Guaiacol contain 1, 2 or 3 minims, dissolved in oil. **Capsules** 2 and 5 minims, *best made with Guaiacol Carbonate*.

Pilula Guaiacol 1 to 3 grains (crystal) require ⅙ grain Compound Tragacanth Powder per grain of Guaiacol with Glucose Syrup.

Capsules of Guaiacol (Carbonate) 1 grain, **with Iodoform** 1 grain and Almond Oil 5 minims, are prepared for use in phthisis, also of Guaiacol ¾ grain, with Cod Liver Oil, 5 minims.

Injections of Guaiacol 5%, and **Iodoform** 1%, in sterilised olive oil, have been used in tuberculosis, they are not free from danger.

Dose.—One, increased to three Cc., but better *per os.*

Durant's Injection. Guaiacol 5, Iodine 1, Potassium Iodide 10, Sterile Olive Oil 100. In pulmonary phthisis.

For tuberculous uveitis Guaiacol has been extolled. 1 Cc. of 1% Solution injected, but these subconjunctival injections are not approved by all.

Injectio Guaiacol Iodi et Camphoræ.

Dose.—4 minims (0·25 Cc.), intramuscularly, increased at three-day intervals to 15 minims (1 Cc.) and this repeated every 2nd or 3rd day.

Contains Guaiacol and Iodine (in oily *combination* as in Iodinol). *aa* : 10% and Camphor 5%.

Sterules of Guaiacol, Iodine and Camphor are made containing ½ and 1 Cc. of the injection.

Rheumatoid arthritis and articular fibrositis, other than the post-infective gouty and gonorrhœal forms, well treated.—G. Watson Smith, B.M.J., ii./25,648.

Vapor Guaiacol Compositus.

Guaiacol and Terebene of each 2, Menthol and Thymol of each 1, Spirit of Chloroform 3. Inhale 5 to 10 minims from an inhaler night and morning. Employed in phthisis.

𝔇 𝔓 1 **Fuller's Inhalant.**

Guaiacol 4, Menthol 2·5, Sydenham's Laudanum 125, Compound Tincture of Benzoin to 250. Sometimes Terebene 4 is added.

Unguentum Guaiacol. Guaiacol 1, Lanolin Ointment (or other suitable basis) 5, useful in orchitis and mumps, and in tuberculosis.

Rheumatoid arthritis is treated with Guaiacol 1, Iodine Tincture 7, to be painted on the joints twice daily with a mixture internally of Ammonium Chloride 15 grains, Iodine Tincture 5 minims, Carbolic Acid 2 grains thrice daily.

Pigmentum Guaiacol.—Guaiacol 1, Olive Oil 1, dissolve.

In eye diseases, *e.g.*, interstitial keratitis, irido-cyclitis, vitreous opacities, sympathetic ophthalmia and optic neuritis, Guaiacol found to be more *certain diaphoretic* than Pilocarpine. Was tried for reduction of temperature, but discarded owing to difficulty of limiting its action. Never used in more than 30 minim doses.

***Caution.*—Pigmentum Guaiacol R.N.H.** is Guaiacol 25 minims, Menthol 25 grains, Olive Oil to 1 ounce. For use in throat work.

In leprosy, external and internal use of value. Used externally with a brush and covered with cotton wool or left exposed, the Guaiacol is rapidly absorbed. Pills 0·1 Gm. with Eucalyptol 0·04 Gm.—two morning and evening, gradually increased, until 10 pills (=1 Gm. Guaiacol) taken daily. Alkaline baths twice weekly, and substantial diet enjoined.—Sem. Medical, Jan. 18, 1911, per Pres.

Guaiacol Benzoas, Guaiacol Benzoate. — *Syn.* ✱BENZOSOL. (T.M. 97425) $C_6H_4.OCH_3.O.CO.C_6H_5 = 228·096$.

Dose.—4 to 12 grains (**0·25 to 0·8 Gm.**) in cachet.

Manufacture.—The expired patent 5366 (1890) method is misleading. We found that heating Guaiacol crystals 12, with Benzoyl Chloride 15 at 150° C. till Hydrochloric Acid ceases to evolve, then pouring into 100 Cc. of 15% solution of Sodium Carbonate gave a theoretical yield.

In small crystals, almost tasteless, nearly insoluble in water.

Incompatible with alkalis. Useful in incipient phthisis (especially the diarrhœa of), and in diabetes mellitus.

Tablets, 5 grains. *Dose.*—1 or 2.

Guaiacol Camphorate.—*Syn.* GUAICAMPHOL.
$[C_6H_4.OCH_3.O]_2(CO)_2C_8H_{14}$ or $C_{24}H_{28}O_6 = 412·224$.

Dose.—5 to 10 grains in cachets or 5 grain tablets.

Soluble only very slightly in alcohol, insoluble in water; for night-sweats and diarrhœa of phthisis.

Guaiacol Carbonas (*B.P.* '14), **and majority of Pharmacopœias.** *Syn.* ✱DUOTAL. $(C_6H_4.OCH_3.O)_2CO = 274·112$.
T.M.: DUOTAL, 197.371/1896.
PATENT 19074/90, now ***Public Property.***

Dose.—5 to 15 grains (**0·3 to 1.0 Gm.**), gradually increased, in cachets or capsules. (The Capsules keep well). **Tablets,** 5 grains.

Manufacture.—By passing carbonyl chloride into an alkaline solution of guaiacol until the liquid on addition of Hydrochloric Acid no longer precipitates.

A white minutely crystalline substance, tasteless, and with slight odour, soluble in alcohol about 1 in 200, but soon crystallises out again with drop of temperature, insoluble in water, slightly in ether, but readily in chloroform and in benzene.

Uses.—In phthisis, improves appetite, and lessens cough, expectoration and night sweats, also in typhoid and for bronchitis.

In rheumatoid arthritis, both the subacute and chronic forms. It arrests the disease and diminishes size and increases movement of joint and relieves pain, by probably inhibiting growth of the specific organism in the intestinal tract, and combining with the bacterial toxins and assisting in their elimination. At first from 5 to 10 grains in cachets thrice daily increasing by one or two grains each week until each dose is 15 to 20 grains—to be continued at least twelve months. At the same time a mixture containing 10 grains of potassium iodide in each dose. Combine with tonics.—A. P. Luff.

Guaiacol as anæsthetic in nose, throat and ear operations.—Pres., May, '20, p. 202.

Guaiacol Cinnamate.—$C_6H_4O.CH_3O.C_9H_7O = 254·112$.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**).

In white granular crystals, insoluble in water. For intestinal phthisis and vesical catarrh. Splits up into its constituents.

Guaiacol Iodide.—*Dose.*—5 to 15 grains (**0·3 to 1 Gm.**). A brown powder insoluble in water, containing about 10% of Iodine used as an intestinal antiseptic, etc., and suggested in phthisis.

Note.—Guaiacol Iodide chemically would contain slightly over 50% Iodine. The above is a diluted preparation.

Potassium-guaiacol-sulphonate. FR. CX. Supp. II., Ph. Ital. IV., P. Jap. IV., P.G. VI., Ph. Ned. V. ✱**Thiocol** (T.M. 219605).

$C_6H_3(OCH_3)OH.SO_3K = 242{\cdot}216$.

Dose.—15 grains (1 Gm.) thrice daily. Tablets contain 5 grains: Syrup 1 drachm 5 grains.

In colourless crystals with slight Guaiacol odour, soluble in water, 1 in 6, slightly in Alcohol. Contains 52% of Guaiacol.

Has been recommended in phthisis, bronchitis and pneumonia, also for intestinal catarrh.

It passes unchanged through the body.—J. M. Fortescue-Brickdale, B.M.J. ./15,1 7.

Calcium-Guaiacol-Sulphonate. *Syn.* GUAIACYL. *Dose.*—10 minims (0·6 Cc.) of 5% solution or 1 Cc. of 10% solution subcutaneously. Local anæsthetic.

Has been employed intravenously, 0·33 Gm. in 20 Cc., in tuberculosis and pulmonary affections. This dose is equivalent to ½ grain of Calcium and 3 grains of Guaiacol.

Guaiacolsulphonic Acid and its salts do not yield Guaiacol in the system and they are thereapeutically inactive,—Y.B.P., '24,340.

HAMAMELIDIS CORTEX ET FOLIA.

Witch Hazel Bark and Leaves.

Dose of bark, twigs, and dried leaves, 10 to 30 grains (0·6 to 2 Gm.),

The bark and leaves, fresh and dried, of *Hamamelis virginiana* (*Hamamelidaceæ*)—*B.P.* '14. Witch Hazel is imported from the United States; it possesses astringent properties.

Uses.—To check hæmorrhages and excessive mucous discharges, and for piles.

Liquor Hamamelidis of Commerce, a distillate of the fresh leaves containing about 14% alcohol by volume. Sp. Gr. about 0·980.

Dose.—½ to 3 drachms (2 to 12 Cc.), and used externally for piles and by rectal injection for internal piles, and to check epistaxis, bleeding from toothsockets. and is applied to bruises.

BRITISH MADE LIQUOR HAMAMELIDIS.—We had occasion in 1918 to distil a small quantity of this from (fresh) leaves cultivated in this country by E. M. Holmes. The aroma was excellent.

For piles, 5 minims of a mixture of equal parts of the liquor and glycerin containing 10% of Phenol, have been injected into piles hypodermically. *cf.* Tom Bird, L. ii./16,149.

Hazel Foam (**Martindale**). *Syn.* **Skin Food.** A soothing, non-greasy ointment basis. May be medicated with all forms of antiseptics and skin applications, *e.g.*, Ichthyol 3%; Ichthyol 3 to 10% with Resorcin 5%; Salicylic Acid 1%; Liquor Carbonis Detergens 10%; Cade Oil 5%; Carbolic Acid 1 to 2½%.

Cremor Hamamelidis L.H.

Solution of Hamamelis 60 minims, Soft Paraffin 120 grains, Wool Fat (Anhydrous) to 1 ounce.

Extractum Hamamelidis Liquidum (*B.P.* '14).

Dose.—5 to 15 minims (0·3 to 1 Cc.).

A 1=1 preparation of the dried leaves made with 45% Alcohol. The liquid extract is representative of the leaves.

VARICOSE VEINS and consequent ulcers. The following is good. Saturate a double layer of lint with it, cover the part and gently bandage. As it dries do *not* pull off but add more of the extract. Healing rapidly effected.—A. T. Thompson.

Flavoring.—Syl Lavandulæ, Syl Menthæ Piperitæ.

HÆMORRHOIDS well treated by interstitial injection of 2 to 5 minims of a 10% solution of Carbolic Acid in Liquid Extract of Hamamelis. A patient who had suffered for a year required 7 injections—another case of 15 years duration needed only 5. The greater the number of piles, the greater the number of treatments required. Patients stated that their rectal and general condition was greatly improved after the first injection.—J. Dunbar, B.M.J. ii./23,808.

"Sterules" of **Hamamelis and Phenol** of the above strength, ½ Cc. are prepared.

Hamamelin.—*Syn.* **Hamamelidin.**

Dose.—½ to 2 grains (**0·03 to 0·12 Gm.**) in pill. The powdered extractive from the bark or (of greenish colour) made from the leaf.

A Suppository of 1 to 3 grains with cacao butter is useful for piles.

𝔇 𝔓1 **Compound Hamamelis Suppository.**—Hamamelin 1 grain Orthoform 5 grains, Cocaine Hydrochloride ½ grain, Opium Extract ⅙ grain, Belladonna Extract ⅙ grain, Cacao Butter to 60 grains. For internal hæmorrhoids.

Ⓟ **Suppositoria Hamamelin, Conii et Eucainæ.**

Hamamelin 5 grains, Conium Extract 4 grains, Eucain ½ grain, in Glyco-Gelatin to 30 grains. Rub down the drugs first with a very little warm water. In painful hæmorrhoids.

𝔇 𝔓1 **Suppositoria Hamamelin et Hydrargyri Composita.**

Mercurial Ointment 1 grain, Hamamelin 2 grains, Ergot Extract 1 grain, Belladonna Extract 1/6 grain, Morphine Sulphate 1/6 grain, Tragacanth *q.s.*, Cacao Butter to 15 grains.

The ingredients were prescribed by the late Campbell Williams with following intent:—The Mercury to act on prostatic hyperæmia often present with piles. Hamamelin on the mucous membrane, Ergot on the muscular walls of blood vessels, Belladonna the same and sedative, Morphine analgesic and vaso-constrictor. The Theobroma Oil as local mechanical lubricant and the Tragacanth for consistency.

Tinctura Hamamelidis (*B.P.* '14).

Bark, in No. 20 powder 1, Alcohol (45%) *q.s.* to 10.

Dose.—30 to 60 minims (**2 to 4 Cc.**).

Is given quite irrationally to check bleeding from the lungs or other organs. The tannin to which its local action is due is converted into sodium gallate on reaching the blood—this substance has no remote astringent action.—B. P. C.

An injection for bleeding piles, 1 drachm of the tincture in 3 ounces of cold water should be given as an enema, and retained, at bedtime or before breakfast, every day; or the Ointment applied locally.—R.

A lotion of 1 or 2 drachms with water to an ounce, is a useful application to bruises and small wounds.

Unguentum Hamamelidis (*B.P.* '14).

This Ointment is largely employed for piles. It may be filled into **Hollow Suppositories.** A combination 𝔇 𝔓1 with Cocaine 2% is useful.

The following is said to work satisfactorily:—Heat on a water-bath Liquid Extract of Hamamelis 2, Starch 1, Glycerin 7, until a jelly is formed, then add Hydrous Wool Fat 8 and Petroleum Oil 2.—P.J. ii./11,631.

HEXAMINA (*B.P.* '14).

$(CH_2)_6N_4$ = 140·128.

Syn. **Hexamethylenetetramine. Hexamethylenamina**, P.G.VI., Ph Ned. V., P. Jap., Fr. Cx. Supp. 1920, **Methenamina** U.S. X., **Urotropine, Aminoform, Formin, Formamine** ***Cystamine** (T.M. 231536). **Cystogen,** ***Metramine** (T.M 262384). **Uritone,** ***Vesalvine** (T.M. 278095).

Trade Mark: 'Urotropine' No. 215652 was ***Avoided*** by Order of the Board of Trade.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**) in a large volume of water, o it may be carbonated water. *Intravenously.*—We have knowledge of 1½ Gm. dose in 10 Cc. Stronger doses have been given. *v.p.* 452. For children, 3 to 4 grains in water 4 to 5 times during the day.

Manufacture.—Mix 1 Volume of Commercial Formalin Solution with 2 Volumes of Liquor Ammoniæ (10%). Allow to stand for a few hours in a loosely covered vessel, and evaporate on the water bath to dryness, taking care that Ammonia is in excess during the process. Recrystallise from Alcohol.

If commercial Ammonium Carbonate is treated with 40% Formic Aldehyde solution it readily dissolves, even without application of heat, with brisk evolution of Carbon Dioxide and formation of Hexamine. Evaporate to dryness on water bath under reduced pressure and sublime or recrystallise from absolute alcohol. The Ammonium Carbonate should be about 10% in excess of theory.—J.C.S.A. i./20,292. Other Ammonium salts react similarly. *ibid.* 373.

Flavoring.—It has only slightly bitter taste. Syl Lavandulæ, Syl Rosæ; Syrupus Aurantii.

Colourless crystals, sublimable. ***Soluble*** 1 in 1½ of water with alkaline reaction, in Alcohol 90% 1 in 8, almost insoluble in Ether. A valuable diuretic and solvent of Uric Acid concretions.

It burns with intense heat and without soot. A 5 grain tablet will boil a test tube half-full of water.

Uses.—It relieves cystitis associated with putrefaction and destroys typhoid bacilli in the urine. The pyuria of tabes dorsalis, cholelithiasis and gonorrhœa (early stages) have been well treated.

As an urinary antiseptic, Hexamine decomposes, liberating Formaldehyde more readily in presence of acid than alkali, hence the administration of **Sodium Acid Phosphate** is advised. It may be well to give the latter an hour or two hours *before* the Hexamine, or at any rate not in mixture form with the Hexamine.

U.C.H. directs **Mistura Hexaminæ** No. 1: Hexamine 10 grains, Chloroform Water to 1 drachm, half an hour *before* food and No. 2: Sodium Acid Phosphate 30 grains, Chloroform Water to 1 drachm, half an hour *after* food.

Investigation of the subject in our laboratories shows that though the amount of Formaldehyde liberated from therapeutic doses of Hexamine cannot be sufficient to kill *B. Coli, the slow generation of Formaldehyde by the drug in the presence of acid has the desired effect.* It is preferable therefore to raise the acid index of the urine within reasonable limits.

For details of our work, see Hexamina, Vol. II.

A recent investigation (13.10.27).—*On maintaining a solution of* 1 *Gm. o*

Hexamine in 200 cc. of 0·2% HCl at 40° C., estimations of the liberated Formaldehyde showed that after 30 minutes 1·5% of the Hexamine had been decomposed, after 1½ hours 9% and after 3½ hours 18% decomposition had occurred.

That Hexamine owes its activity to formation of Formaldehyde is considered a myth.—G. E. R. McDonagh, M.P.C., Jan. 12, '27,27.

Cholecystitis.

Gall stones are found in about 10% of the bodies of all people dying after the age of 20. In most cases, if not all, their formation is preceded by cholecystitis and as cholecystitis is often not followed by cholelithiasis thé former must occur therefore at some period in the lives of a considerable proportion of all adults—the most common of all abdominal diseases. The medical treatment of cholecystitis often leads to recovery. It consists in attempting to sterilise the biliary passage by large doses of Hexamine and in promoting biliary drainage. Knott has shown Hexamine acts as a ***biliary antiseptic in spite of alkalinity of the bile.*** Hence alkalis may be given to keep the urine permanently alkaline to prevent the bladder being irritated by the Formalin formed in acid urine. Two mixtures are made one with Hexamine 100 grains to the ounce, and the other containing 1 drachm each Sodium Bicarbonate and Potassium Citrate to the ounce. Half ounce of the former and one ounce of the latter are given after breakfast, after tea, and after a tumbler of milk or water last thing at night The dose of Hexamine mixture is increased by 1 drachm each day until the full dose of 100 grains is taken three times daily. Knott has recovered Hexamine from the bile, obtained with a duodenal tube, and has demonstrated sterilisation of infected bile. Biliary drainage is promoted by Magnesium Sulphate *per os*. To give it directly into the duodenum is not necessary.—A. F. Hurst, B.M.J. ii./26,676.

Operations on the biliary tract should be preceded by Hexamine 10 grains three times a day for a week at least.—W. E. M. Mitchell, L. ii./27,270.

COMMON COLDS can be aborted by Hexamine. The drug is stated to be excreted by the saliva and bronchial mucous membrane, hence the idea. It should be given at once when the discomfort begins,—15 grains four times during 24 hours in water. Patient should drink water copiously to reduce bladder irritation.

RESPIRATORY AFFECTIONS (acute bronchitis, acute rhinitis, etc.), well treated. Keep patient indoors, give Cotoin ¼ grain with Soda every 15 minutes for four doses, 6 hours later Magnesium Sulphate 2 teaspoonsful, then Hexamine 10 grains (adult) in full glass of water at first thrice and subsequently twice daily. Rhinitis and bronchitis were cured in 3 to 5 days; influenza in from 5 to 7 days. No untoward effects were observed, even when as much as 30 grains daily were given.—Pres. Oct. 1912,257; B.M.J. i./14,1158.

In AURAL SUPPURATION and MENINGITIS Hexamine has been tried, but neither it nor Formaldehyde could be detected in the discharge or cerebrospinal fluid.—D. Guthrie, B.M.J. ii./16,455.

In WHOOPING COUGH may also be of value, *e.g.*, with Syrupus Thymi.

Sufficiently large doses (75 grains *per diem*) will inhibit growth of bacteria in the bile, *e.g.*, in typhoid. Suggested for treatment of INFECTIONS OF THE BILIARY PASSAGES and as a protective measure before operations on the gall bladder or bile ducts. Also for its antiseptic action in threatened or actual cerebro-spinal infections. Experiments on animals show that it may be of value in preventing meningitis. Its prompt use *per os* conveys it to the cerebro-spinal fluid in 30 to 60 minutes. In 35 cases of fracture of the base of the skull with bleeding or escape of cerebro-spinal fluid from the nose or ears meningeal infection never occurred.—Pr., Nov. '09,720; L. ii./12,1231. —Glas. Med. Jl., Nov., 1912.

ACUTE POLIOMYELITIS. Child aet. 11 became acutely ill suddenly. Weakness of legs. Temperature 104. Hexamine 10 grains every four hours. After two days temperature lower but paralysis more marked. Next day improvement, but in the evening, after 150 grains had been given, hæmaturia with considerable strangury occurred. After three days paralysis ceased and ultimately the renal symptoms. Complete recovery in sporadic cases is rare.—N. Fox Edwards, B.M.J. ii./16,620.

HAEMATURIA in a case of acute encephalitis due to Hexamine in doses of 20 grains every 6 hours.—Sir Thomas Horder, B.M.J. i./27,995.

☛ In BLADDER DISEASES 20 to 40 grains daily suffice, while in gall bladder infection, or purulent meningitis, from 200 to 300 grains daily may be required. Give well diluted (2 grains to the ounce of diluent) *per os* or it may, if necessary, be given by rectum or subcutaneously.—A. C. Burnham, Med. Rec., July 5/13, per Pres., Oct., 1913.

Should never be given immediately after meals, but taken in water ½ hour before meals.—B.M.J. i./21,750.

Hexamine found superior to Mercurochrome and Hexyl-Resorcinol in infection by *Staph. albus* and *B. coli.*—Jl. Urol., Apl., '26,351, per Pres., Jan. '27,8.

Hexamine 3 grains, and Methylene Blue ¼ grain, to enhance the well-known action of Hexamine.—B.M.J., ii./25,18.

RINGWORM OF THE BEARD. Treatment.—A 5 to 10% solution of Urotropin is sponged on the part affected. This is allowed to dry and a solution of Dilute Sulphuric Acid 1 to 3% is then sponged over the affected area. There were most gratifying results in the condition known as "foul shave." Where the parasite is the ringworm fungus this method is undoubtedly a specific. It cured the most chronic case when continued for 4 or 5 weeks in gradually increasing strengths.—J. Craik Taylor.

Intravenous injection. RETENTION OF URINE. Treated by 5 to 10 Cc. of 40% Urotropine Solution.—B.M.J.E. i./23,65.—Has been used in cystitis, pyelitis and toxæmias.

For pyelitis of pregnancy a single injection of 10 Cc. of the Solution is often sufficient.—A. Jacobs, Pr., Oct. '27,219.

POST-OPERATIVE ANURIA.—Successful and harmless treatment.—Per Jl. A.M.A., ii./25,1013.

Post-operative retention of urine well treated by injection of 7 to 10 Cc. 40% solution of Urotropine intravenously—procedure uniformly successful. —L. i./24,1118.

CHOREA in children well treated by Hexamine intravenously. In one case 18 injections, increasing from 2 to 6 Cc. of a 5% solution, were made in 6 weeks. More recently 10% solution has been used with good results.—Per Jl. A.M.A., ii./25,1098.

Non-diabetic acidosis, due to infection with *B. coli*, well treated by intravenous injections.—J. Fraser, B.M.J. i./24,571.

SCABIES severe, well treated with Urotropine *intravenously*, 10 Cc. of a 10% solution daily for 3 or 4 days, septic lesions being washed with hot water only during period of injections, but course of injections followed up by application of Sulphur Ointment.—N. N. Ghosh, I.M.G., May, '25,221.

Hexamine proved conclusively *not a diuretic*.—H. O. Rich, and P. J. Hanzlik, per Pres. Feb. 23,84.

Vesalvine Tablets 5 grains and **Vesalvine Effervescent**, 5 grains in 1 drachm are prepared.

Hexamine Triborate *Syn.* ✱BOROVERTIN (T.M. 294360).
Ph. Ned. V. $(CH_2)_6N_4.3HBO_2 = 271{\cdot}912$.
Dose.—15 to 60 grains (1 to 4 Gm.) daily.

Manufacture.—By combining 1 molecule Hexamethylenetetramine with 3 molecules of Boric Acid—$3H_2O$ are set free and the Boric Acid is converted into Metaboric Acid.

Crystalline powder containing about 50% Hexamethylenetetramine, soluble in water 1 in 13 : taste bitter. Urinary antiseptic, *e.g.*, in gonorrhœal cystitis, pyelitis, renal calculus and tuberculosis of the bladder and kidneys—not always successful.

✱Vesalvine 'B.' *Syn.* HEXAMETHYLENETETRAMINE BENZOATE
$(CH_2)_6N_4.C_6H_5.COOH. = 262{\cdot}176$.
Dose.—5 to 15 grains (0·3 to 1 Gm.).

Small scaly crystals containing about 53% of the base. Made by combining equivalent quantities and crystallising. Soluble 1 in 50 of Water and 1 in 2½ Alcohol 90%.

Uses.—As an urinary antiseptic.

✱Cystazol (T.M. 364369). *Syn.* Hexamine-Sodio-Benzoate.

Tablets.—10 grains (0·6 Gm.).

Dose.—One to three dissolved in water twice or thrice daily, in bacterial infections of the urinary tract.

✱Uro-Hexoids (T.M. 365610). Tablets of HEXAMINE AND LITHIUM BENZOATE.

Dose.—One or two after each meal, taken whole or crushed and dissolved in water. Urinary antiseptic, diuretic and anti-lithic.

In cystitis, pyelitis and tuberculosis of the bladder and kidneys, also for chronic posterior urethritis and prostatitis and rheumatic affections.

✱Vesalvine 'S.' *Syn.* HEXAMETHYLENETETRAMINE SALICYLATE, SALURENE. $(CH_2)_6N_4.C_6H_4.OH.COOH = 278·176$.

Dose.—5 to 15 grains (0·3 to 1 Gm.) in water, preferably on an empty stomach.

Colourless prismatic crystals with agreeable sweetish saline taste, containing approximately 50% of each constituent. Prepared by combining equimolecular proportions.

Soluble 2 in 1 in Water and 1 in 2 in Alcohol.

Uses.—This salt should be especially useful as an urinary and intestinal antiseptic, *e.g.*, in cystitis, bacilluria, gastro-intestinal catarrh, colitis, dysentery, diarrhœa, dyspepsia, and all cases beneficially treated by hexamine—it is exceedingly soluble. It doubtless splits up on passing through the system into its two constituents,—the Salicylic Acid enhancing the effect of the Hexamine.

B. COLI INFECTIONS OF BLADDER AND KIDNEY.

Alkalinization of the urine should be obtained at earliest possible moment. Where this failed urinary antiseptics often successful. Hexamine Salicylate seems best.—J. Ferguson, B.M.J. i./22,57.

Note.—Though so markedly soluble in water there apparently exists a state of dissociation in solution, for example, Solutions of strength 1%, 3%, 6%, 12%, 25%, 50% and saturated remain clear for months, whilst vigorous rubbing on the sides of the vessel will cause a deposition of Salicylic Acid crystals.

Analysis.—Estimate Salicylic Acid content by titrating with N/10 Sodium Hydrate, using Phenolphthalein as indicator. 1 Gm. should require not less than 34 Cc.

Incompatible with acids, alkalis and carbonates, also with Sodium Salicylate—it throws the Salicylic Acid out from same—and otherwise as Salicylates, hence best administered as such, not in a 'mixture.' It decomposes on heating in water or alcohol.

Vesalvine 'S.' Tablets 5 grains and **Cachets** 5 and 10 grains also **Elixir Vesalvine 'S.'** 5 grains in 1 drachm, are prepared.

A dose of 15 grains produced slight dull feeling in the head. This was not felt with 7½ grains.—W. H. M.

A medical man—a sufferer from urinary bacillary infection—found a few doses cleared the urine in 3 days, and it did not irritate the bladder like other antiseptics, of which he had tried practically all.

Hexamethylenetetramine Camphorate *Syn.* **✱ Amphotropin** (T.M. 338474) $[(CH_2)_6N_4]_2C_8H_{14}(COOH)_2 = 480·384$.

Dose.—8 to 12 grains (0·5 to 0·8 Gm.). Tablets 8 grains (0·5 Gm.).

A white crystalline powder made by combining in Alcohol, Chloroform, etc. Subject of patent 21728/12.

Soluble in water 1 in 10 with acid reaction. Solutions are hydrolysed to a great extent.

Uses.—Urinary antiseptic. An alkaline urine is rendered neutral or acid by administration. In chronic cystitis, bacteriuria, nephritis.

Hexamine - Sodium Acetate, *Syn.* ✱ **Cystopurin** (T.M. 288836).
$(CH_2)_6N_4.2CH_3COONa+6H_2O=412{\cdot}266.$

Contains approximately 34% of Hexamine.

(✱**Cystoformin** (T.M. 374328) is a proprietary preparation of this kind containing 40% of Hexamine).

Dose.—30 grains (**2 Gm.**). A crystalline salt made by evaporating solutions of the components in the above proportions. In gonorrhœa and cystitis.—**Tablets contain 1 Gm.** (15 grains).

✱**Urodonal** (T.M. 361117). A granular effervescent preparation of Hexamine with small amounts of Sidonal and Lysidine.—B.M.J. i./16,364.

Dose.—3 teaspoonsful during the day. The three components are stated to be useful in removing uric acid and allied bodies. Claimed to be of value in rheumatic affections.

✱**Felamine** (T.M. 396797), ✱**Sandoz** (T. M. 439637).

Syn. HEXAMINE GLYCOCHOLATE.

Cholagogue and biliary antiseptic. In catarrhal jaundice, constipation and enteritis and in the after-treatment of typhoid fever and for gallstones. Tablets contain 5 grains (0·3 Gm.).

HYDRARGYRUM.

$Hg = 200{\cdot}61.$

Antidotes to Acute Poisoning by Mercurial Salts.—Emetics by mouth, Apomorphine hypodermically; white of 1 egg for every 4 grains of Perchloride (avoid excess), or milk; reduced iron; alcohol or ether for collapse; and opium for pain.

Uses.—Purgative, cholagogue and antisyphilitic.

Purification of Mercury. Allow it to flow in a thin stream through a long column of Nitric Acid. Wash and filter through chamois leather.

Hydrargyrum cum Creta (*B.P.* '14). *Syn.* **Grey Powder.**

Dose.—1 to 5 grains (**0·06 to 0·3 Gm**). Slipule No. 5 holds 1 grain.

Contains 33½% Mercury. Is said to become stronger on keeping by oxidation. That of U.S. X. is prepared with Mercury 38, Clarified Honey 10, and Prepared Chalk 57. Moistened *q.s.* and dried—has sweet taste and is somewhat damp.

Smallpox (3 cases of confluent) treated with 10 grain doses thrice daily. Result surprisingly good.—Mercury appears to abort the disease and produces no ptyalism.—B.M.J. ii./10,120.

Injectio Hydrargyri Intramuscularis "10%." *Syn.* INTRAMUSCULAR INJECTION OF MERCURY. F. J. Lambkin's original formula.—B.M.J. ii /05,1257,1348.

Mercury 1 ounce (troy), Anhydrous Lanoline 4 ounces, Liquid Paraffin (Carbolised 2%) to 10 ounces (by volume).

Dose.*—This contains 1 grain in 10 minims,—the maximum dose once a week. Physicians should specify* '10%' *using the above name in full to prevent confusion with stronger preparations.*

Sterules, Hypodermic, are prepared containing 10 minims.

Site of Injection.—An area around a point midway between the gluteal cleft and the anterior superior iliac spine is best.—G. Pernet. *Sterilise Syringe in Liquid Paraffin.*

Experiments which we conducted showed that this suspending mixture is probably as useful as any. It holds up the mercury even in hot weather—of great importance for accurate dosage. We compared it *inter alia* with formulæ containing Cocoa Nut Fat and Paraffin Oil, but came to the conclusion that they were no improvement. Some preparations yield a heavy precipitate at tropical heat.

The preparation is slowly absorbed and practically painless. Diarrhœa, if caused by the injections, may be warded off by 5 grain Cachets of Bismuth Salicylate.

A special preparation of **Mercurial Cream** (1 grain in 10 minims) is also made with a fatty basis containing **Palmitin** (from Palm Oil). In addition it contains Creosote and Camphoric Acid of each 10% (or 20% of the compound called '**Creocamph**'). The Creosote and Camphoric Acid prevent the occurrence of pain sometimes supervening 3 or 4 days after the injection.

Before using Mercurial Cream, *weekly* injections of **Calomel Cream** containing 5% Calomel in the same vehicle have been suggested. *Dose.*—10 minims = ½ grain of Calomel. *cf.* also **Injectio Hydrargyri Subchloridi Hypodermica.**

No Salt of Mercury comes up to Calomel for removing active signs of syphilis, but the effect is only transitory in comparison with metallic Mercury (¾ grain of Calomel is given once a week for four weeks and *then* metallic Mercury). Calomel suspended in Olive Oil is exceedingly painful. The addition of Creosote and Camphor produces analgesia—and can be given with impunity.

Contraindications. Old people, broken down Alcoholics, those with renal disease, with Albumin in the urine, tubercular subjects, those with lead poisoning and gouty persons should not have the treatment.

Injectio Hydrargyri.—STAFF SURGEON ADAMS' FORMULA. ROYAL NAVY FORMULA (G. B. Scott, Roy. Com. on Venereal Diseases). *Syn.* Cremor Mercurialis Mid. H.

Dose.—5 minims (=1 grain of Mercury) given once a week. Mercury 20, Anhydrous Lanolin 30, Chlorbutol 2, all by weight, Liquid Paraffin to 100 by measure.

Huile Grise, FR. CX., PH. NED. V. *Syn.* GREY OIL, OLEUM CINEREUM

Dose.—An injection of 2 to 3 grains (**0·12 to 0·2 Gm.**) = ⅔ to 1 grain Mercury approx. (**0·04 to 0·06 Gm.**), every eight days for 5 or 6 weeks—or up to seven divisions of the Barthelemy's syringe (*v. infra*), *i.e.*, **0·07 Gm.** Mercury.

Mercury 40, Wool Fat 26, Vaselin Oil (FR. CX.) 60—all by weight. Measures 100, *i.e.*, 40% w/v. Mercury (**0·4 Gm. in 1 Cc.**). Ph. Ned. V. is similar. FR. CX. gives method to produce a sterile product.

Barthelemy's Syringe (used in France) is graduated so that when used with a 40% *w/v.* Grey Oil, 1 cgr. of Metallic Mercury is contained in each of its divisions; 14 cgr. or approx. 2½ grains in the syringe-full.

Fournier's Syringe is ½ Cc. in capacity divided into 10 on the barrel so that each division represents 2 cgr. of Mercury using the 40% w/v. product.

Levy-Bing-Lafay-Syringe has piston rod graduated into 15 divisions each of which represents 1 cgr. using the above.

A 10% preparation, e.g., the **Injectio Hydrargyri Intramuscularis** at the commencement of the chapter, is preferable.

Suppositories containing the 40% Grey Oil in various strengths have been used in syphilis. Efficacious, simple, and safe.

Intravenous Injections of Mercurials are painless, have small dose, are certain of absorption, rapid of action, and do not salivate.

Difficulties of the method, of obtaining consent of patient, possible thrombosis, pyæmic infarction, necessary daily injection. Violent dysentero-diarrhœic symptoms or polyuria and even albuminuria may result.

Solutions of mercuric cyanide, 20 minims of 1% solution (*i.e.*, ⅕ grain) oxycyanide, biniodide, succinimide and perchloride have been used.

Linimentum Hydrargyri (*B.P.* '14).

Useful stimulant for enlarged joints and glands.

In affections of the peritoneum, involving the lower quadrants of the abdomen or pelvis, Mercury is without rival. In appendicitis Mercury inunction reduces the pain, mitigates thirst, and effects copious evacuation and urination, also suitable in all cases of infection of the peritoneal serous membrane.

Mercurettes. Oblong blocks containing 30 grains of mercury incorporated with 60 grains of Cacao Butter. With brisk rubbing spreads over the skin and penetrates. The firm consistence is agreeable in use.

By warming may be spread on the linen to form a mercurial plaster (non-adhesive) for use in synovitis, chronically enlarged glands, and arthritis or for aborting boils and carbuncles.

Pilula Hydrargyri (*B.P.* '14), **Blue Pill.** *Dose.*—**4 to 8 grains (0·25 to 0·5 Gm.).**

Contains 33% Mercury by weight.

In raised arterial tension when indicative of danger, a pill twice or thrice weekly, followed by Saline is beneficial.—Brunton.

In syphilis, begin with 3 grains a day after the first and last meal, increasing the daily dose by 1 grain each week till patient is taking 2 grains thrice daily. An average dose is 2 grains twice a day.

In cardiac dropsy it seems to act complementarily to digitalis and to prove efficient where latter has failed to increase urinary secretion materially. It is to be avoided if renal disease be present. When diuresis is fully established discontinue Mercury and give a mixture of Caffeine and Spirit of Nitre with Infusion of Broom Tops.

Has good soporific effect in forms of biliousness where sleeplessness is a prominent symptom.—W. J. Tyson, Clin. Jl. Aug. 8/23,382.

* **Mercurol**, (T.M. 228096) (*cf.* **Nargol.**)

A combination of Mercury with Nuclein. Used for gonorrhœal injections ½ to 2% solutions.

Has been given internally in syphilis in 2 grain doses.

Unguentum Hydrargyri (*B.P.* '14).

Mercury 30%, as required by F.I. Principally used for inunction in syphilis. To relieve local inflammation and to destroy pediculi.

Fr. Cx. (*Onguent Napolitain*). Mercury 1, Benzoated Lard 1.

U.S.—Mercury 50, Oleate of Mercury 2, Suet 23, Benzoated Lard 25.

P. Svec. Contains **Hydrargyrum Exstinctum** 36 (*i.e.*, Mercury 'killed' by rubbing with Wool fat and containing 83·5% Hg.), Benzoated Lard 44, Suet 20, *i.e.*, about 30% Mercury.

Unguentum Hydrargyri Mite (Dilutum), U.S. X. Mercurial Ointment (U.S.) 60, Petrolatum 20, 'Unguentum' 20. *This is therefore an approx.* 30% *Hg. preparation—cf. B.P.C. infra.*

Inunction treatment of syphilis.—5 Gm. is an initial dose of a 33% Ointment. ***Caution.***—Directions for treatment of gingivitis if this occurs. Paint with 10% Chromic Acid, or stronger up to even 75%. Give Mineral Waters—Aix la Chapelle, Uriage, Harrogate, etc.—D. Freshwater, Pr. Mar. 1912.

Unguentum Hydrargyri Compositum (*B.P.* '14). Mercury Ointment 10, Yellow Beeswax 6, Olive Oil 6, Camphor Flowers 3. This is *Scott's Dressing, modified.*

For enlarged glands, chronic synovitis and syphilitic nodes. Swelling of the ankles is well treated with it.

Unguentum Hydrargyri Mite, B.P.C. *Syn.* **Blue Unction.** Mercurial Ointment 1, Lard 2. Mix. For destroying lice. *This contains* 10% *Hg.—cf. U.S. antea.*

To promote the removal of the effusion of pleurisies, the rubbing into the chest of half a drachm of Mercurial ointment twice daily is often useful.—Burney Yeo.

Lanolinum Hydrargyri.

Mercury 100, Lanolin (Hydrous) 200, Mercurial Ointment 5, Mutton Suet 50. For inunction in syphilis (effect is rapid); used daily 4 to 8 times after a hot bath. *See also* **Mercurial Injections.**

The idea of using the various fats (wool fat, mutton suet and the lard—in the Mercurial Ointment) was to favour absorption—reference to Liebreich's work and a paper by A. S. Gubb to the M.P.C. 1886.—P.J. i./21,516.

Inunction *at night* probably prevents pullulation of the spirochaete on the surface of the body—a habitat which these organisms find particularly favourable for perpetuation of their species by transmission to another individual. Sp. Pallidum appears to swarm at night in the tissues of indurated chancres, at any rate.

In hospital practice (army), inunctions and baths for in-patients, with weekly grey oil injections for out-patients, gave satisfaction.—L. ii./11,1386.

Scleroderma with obstinate callous ulcers on the legs improved under mild Mercurial inunctions.—P.R.S.M.—Dermatology Section, Nov. '10, p. 13

One thorough course of inunction of Unguentum Hydrargyri ⅔ drachm in Lanolin or other base ⅓ drachm, in the early stages (first six months) of syphilis is of inestimable value. Requires care but mortality is small.—Maj. French, B.M.J. i./11,593.

DISCUSSION ON THE TREATMENT OF TABES DORSALIS.—Syphilis the important etiological factor without which there would be no such disease as tabes. Inunctions or injections were superior to Mercury by the mouth, and perhaps better by inunction than by injection.—B.M.J. ii./10,1249. Pseudo-tabes—the result of syphilitic meningitis—treated by inunction.—B.M.J. i./09,1403.

Absorption of Mecurials from Ointments applied to the skin.—The method was to rub a weighed quantity into 20 square inches of surface, and ascertain the amount not absorbed. The greatest absorption of mercury took place from a lard basis. Hydrous wool fat was absorbed to a greater extent than lard, but the mercurial was not absorbed with it, so the absorption of mercury was actually less than from a lard ointment of equal strength. Absorption from a ***paraffin basis*** was always ***less than from a lard base.*** Of the various mercurials examined, mercuric oxide was the most readily absorbed either as such or in the form of the official oleate, but ointments containing over 10% of the oxide are irritant. Ammoniated mercury and mercury salicylate are absorbed almost as well as the oxide. Mercurous chloride was absorbed to a less extent than any of the mercurials examined. The inunction of ***4 Gm. of Mercury Ointment B.P.*** gave an absorption into the body not exceeding ***0·12 Gm. of Mercury*** when used for 2 minutes and 0·17 Gm. in 10 minutes.—R. B. Wild and Ivy Roberts, B.M.J. i./26,1076.

See also our experiments with a variety of Ointments under Methyl-Aspriodine. In no instance were we able to trace that the chemicals were promptly excreted in the urine.

Mercury Amalgam.

This is one of the most popular of dental fillings. Black (*Cosmos*) suggests: Silver 68·5, Tin 25·5, Zinc 1, Gold 5.

In use, the alloy is worked up in a glass mortar with an equal quantity of Mercury, and the excess of Mercury is squeezed out immediately before filling in. It is the general rule to employ a double filling, *i.e.*, to insert an initial filling of zinc oxy-sulphate or oxy-phosphate, *q.v.*, and afterwards an amalgam when a metal filling is employed, and where depth of the cavity will allow.

Amalgam fillings of teeth may cause Mercury poisoning in susceptible people.—L. i./26,1275.

Ⓟ**Hydrargyrum Ammoniatum** (*B.P.* '14). **U.S. X. P. Dan., P. Svec. X., Ph. Ned. V.**

Mercuric Ammonium Chloride, Hg. NH_2Cl (U.S.) = 252·091. **White Precipitate.** A white powder, insoluble in water but soluble in hydrochloric acid.

The official name for *Calomel* in Belgium is *Hydrarg. præcip. alb.* —danger of error.—C. Rousseau, B.P. Conf. 1923.

Ⓟ**Unguentum Hydrargyri Ammoniati** (*B.P.* '14).

Strength 5% in Benzoated Lard.

Benzoic Acid in the Benzoated Lard causes a faint yellow tinge; plain lard does not cause the colour.—H. Stout, P.J. i/17,187.

In pruritus and other skin affections.

Ⓟ**Unguentum Hydrargyri Ammoniati Dilutum, N.H.W.** Equal parts of the B.P. 1898 ointment, (1 in 10 of Paraffin Ointment), and soft paraffin (white).

Pustular eczema, resulting from pediculosis capitis in weakly children, is well treated with equal parts of this ointment and olive oil, enclosing the head in an oiled paper cap.

Ⓟ**Unguentum Hydrargyri Ammoniati, U.S.**

Ammoniated Mercury 1, Liquid Paraffin 1, Hydrous Wool Fat 4, White Petrolatum 4.

A wet process of making.—P.J. i./22,379.

Tinea circinata can be rapidly cured by this ointment.—L.i./09,966.

Unguentum Prophylaxis. For prophylactic measures against syphilis. Metchnikoff suggests the use of Lanolin Ointments containing Ⓟ White Precipitate 25% or Calomel 25%, or $\boxed{\text{P1}}$ Mercuro-Salicyl Arsenate (*q.v.*) 25%. (*Physicians should specify which is required when prescribing Unguentum Prophylaxis.*) These are less irritating than Mercurial ointment. To be used by inunction for **4 or 5 minutes after coitus.**

For use in the Navy—Calomel Ointment 33% made with Lanolin; 50% strength also mentioned in the same paper.

Medical men, students, and nurses advised to have the ointment handy to apply to any suspicious crack about the fingers, etc.

Early application of an ointment of Calomel 10 and Lanolin 20 is said to have prevented syphilitic infection by killing the Treponema.—L. ii./11,1386.

Capsungs of the ointment, with elongated points to be torn off, and 'Collapsubes' of the ointment are prepared.

Unguentum pro Eczema, N.H.W.

Ammoniated Mercury 10 grains, Lead Acetate 10 grains, Zinc Oxide 20 grains, Mercuric Nitrate Ointment 20 grains, Soft Paraffin ½ ounce, Lard ½ ounce.

Ⓟ**Cremor Lowndes.**—Ammoniated Mercury Ointment 1, Zinc Ointment 3 Glycerin 2, *misce s.a.*—Squire.

Black Precipitate $NH_2Hg_2Cl.$ = 452·701. **Formed when Ammonia Solution** is added to Calomel. The substance is regarded by some as a mixture of White Precipitate NH_2HgCl and metallic Mercury.—P.J. ii./21,260.

Hydrargyri Benzoas. **Mercuric Benzoate.** FR. CX.
$Hg.(C_6H_5COO)_2.H_2O=460{\cdot}706$.

Dose.—$\frac{1}{50}$ to $\frac{1}{10}$ grain **(0·0013 to 0·006 Gm.)**

A white crystalline powder, practically insoluble in cold water, ***soluble*** about 1 in 180 of Alcohol 90%.

In pill for syphilis. Injected, large doses are necessary, and Cocaine may be added.

Intramuscular injections have been given in uterine hæmorrhage.

Septic infections such as septicæmia, pyæmia, erysipelas, puerperal fever, septic sore throats treated by Mercury Benzoate Injections—10 Cc. of 1% Solution which represents average of 1·5 mgr. per kilo body weight. If repeated the body attains a resistance against *Strepto* infections, while smaller doses inhibit the generalised growth of the Cocci. The method can be used indiscriminately in all septic conditions to disinfect the blood and tissues, provided it is applied before the invasion is too extensive or widespread. It is to be regarded as prophylactic rather than curative. It had been observed that mothers taking Mercury shortly before or during childbirth did not suffer from puerperal infections even though the conditions were most unhygienic, also that syphilitics undergoing mercurial treatment do not catch the ordinary infective diseases.—B.M.J.E. ii./13,79.

FR. CX. gives mode of preparation, employing Yellow Mercuric Oxide, Acetic Acid (glacial), and Sodium Benzoate.

Hydrargyri Bromidum, MERCURIC BROMIDE. $HgBr_2=360{\cdot}442$.

Dose.—$\frac{1}{16}$ to $\frac{1}{4}$ grain **(0·004 to 0·016 Gm.)**. Silvery Scales. ***Soluble*** to the extent of 1 in 250 water; decomposes on boiling.

In syphilis in solution with Sodium Bromide thus,—Mercuric Bromide 1·8 Gm., Sodium Bromide 1·03 Gm., Water 100 Cc. is employed in dose of 1 to 2 Cc. of the solution (=0·01 to 0·02 Gm. Hg.) intramuscularly into the buttock. A platinum-iridium needle is essential. Some pain may be caused.

Hydrargyri Carbolas. **Phenol Mercury.**
$Hg.(C_6H_5O)_2.H_2O = 404{\cdot}706$.

Dose.—$\frac{1}{2}$ to 2 grains **(0·03 to 0·12 Gm.)** daily.

A whitish amorphous powder, obtained by double decomposition of mercuric chloride and an alcoholic solution of phenol in caustic potash.

[P1] **Hydrargyri Cyanidum,** **Cyanuretum Hydrargyri** FR. CX.; P.G.VI. **P. Belg.,** $Hg.(CN)_2 = 252{\cdot}626$.

Dose.—$\frac{1}{20}$ to $\frac{1}{4}$ grain **(0·003 to 0·016 Gm.)**. FR. CX. has *max. single dose* $\frac{1}{6}$ grain, max. during 24 hours $\frac{5}{8}$ grain approximately.

Intravenous Dose.—1 Cc. of 1% Solution considered a max. single but more has been given, *see Intravenous Dose Table et infra.*

This Cyanide is in anhydrous, white or colourless, prismatic crystals. ***Soluble*** 1 in 12 of water and 1 in 4 of glycerin. It is not decomposed by alkalis; it is used as a lotion to syphilitic sores, and given in pills of $\frac{1}{10}$ or $\frac{1}{12}$ grain twice daily. Used in diphtheria, $\frac{1}{250}$ grain frequently, with 1 minim Tincture of Aconite in honey, employing also a gargle, 1 in 10,000.

In syphilis 20 minims of 1% solution daily with caution. Has also been used intravenously. This dose given alternate days. It has been advised for persistent cerebral headaches of the secondary period.—L. ii./12,361. *Intramuscularly* relatively painless but may cause diarrhœa and albuminuria.

If given ***intravenously*** as in combined Organic Arsenic and Mercury treatment of syphilis, care must be taken to give strictly intravenously and not intramuscularly or hypodermically.

Sterules contain $\frac{1}{12}$ grain (0·005 Gm.) in 1 Cc. also $\frac{1}{6}$th grain (0·01 Gm). in 2 Cc.

SYPHILIS.—One injection of one of the Salvarsan substitutes and five injections of 1% Cyanide solution per week. Doses of the latter varied with tolerance of the patient, and it was found that many patients could stand 40 to 50 m. so that they received 200 to 250 m. in course of a week. Superior to other routine methods.—J. Ernest Lane, L. ii./21,796.

Syphilis, nasal and aural, treated by 1 Cc. of 1% solution intravenously. Much used in France. May occasion diarrhœa.—D. Guthrie, Pr. Feb. 20,131.

P1 **Injectio Hydrargyri Cyanidi, Plaistow.** *Dose.*—2 to 10 minims. For subconjunctival use. 1 in 5,000 of water.

Subconjunctival injections of 20 minim doses of 1 in 4,000 solution will cure commencing senile cataract. Pain is very severe, lasting 3 or 4 hours. Patient should be under light chloroform anæsthesia.—Lieut.-Col. H. L. Smith, L. i./12,1056. See also B.M.J. i./06,262.

Metastatic ophthalmia treated by, also given intramuscularly.—Pres. Feb. 21, p. 74.

P1 **Solubes Hydrargyri Cyanidi et Boracis.**—Mercuric Cyanide 1 Gm., Borax 2 Gm., Potassium Chromate 0·075 Gm., Fluorescein 0·001 Gm.

One to be dissolved in a litre of water to produce an antiseptic solution for obstetric work.—L. i./08,876

P1 **Pasta Hydrargyri Cyanidi.** 1 in 500 in Tragacanth basis for smearing on catheters.

P1 **Hydrargyri Oxycyanidum,** $HgO\ 3[Hg(CN)_2] = 974{\cdot}488$.

Dose.—1/16 to 1/6 grain (**0·004 to 0·01 Gm.**) *per os.*

Intravenously 1/6 grain (**0·01 Gm.**) in 75 minims (**5 Cc.**) has been given in syphilis, sometimes in less diluent.

Chemical Composition.—According to **P.G. VI.** must contain 33·3 to 35·2% $[Hg(CN)_2.HgO]$ equivalent to 15·37 to 16·25% Mercuric Oxide and 84·6 to 83·8% of total Mercury Cyanide. It is a mixture of approx. 34% Mercury Oxycyanide and 66% Mercury Cyanide.

P. Svec. X. is a mixture of the Oxycyanide $Hg(CN)_2HgO$ and Cyanide, containing 30 to 40% of Oxycyanide.

The compound, from the point of view of irritating effect on the tissues, and its failing to attack surgical instruments, should in preference be the crystalline body of the above formula and not $HgO\ Hg(CN)_2$. P. Helv. gives the latter formula but the characters and tests agree rather with the compound $HgO\ 3[Hg(CN)_2]$.

Danger of explosion in manufacture.—$HgO\ Hg(CN)_2$, sometimes called the normal Oxycyanide, is dangerous to heat. The other compound is not.—F. C. J. Bird, P.J. i./23,383. See also J.C.S.A. i./1922,640.

Solubility.—This varies with the proportion of HgO present. We found a commercial sample, of the variety preferred, to be soluble 1 in 17 with a small amount of residue.—1924.

The pure salt, *i.e.* the normal compound (*antea*), was found to be soluble 1 in 85½. 'Trade' Oxycyanides vary.—A. J. Jones, P.J. ii./20,87 ; i./23,127, see also Comey and Bahn's 'Dictionary of Solubilities.

Uses.—In the treatment of syphilis during first week 0·05 Gm. in pill *pro die* as an average has been given—to be taken when the stomach is full. Should not be used with Potassium Iodide.

As a wound lotion 0·2 to 0·6% solutions have been employed, 1 in 10,000 to 1 in 5,000 as bladder irrigant—in eye work 1 in 1,000 to 1 in 5,000—and 1 in 200 for instruments, which it is said not to attack.

Gonorrhœa treated by irrigation with Mercury Oxycyanide, 1 in 2,000, also Potassium Permanganate, 1 in 6,000 for acute, to 1 in 2,000 for chronic cases.—H. J. Blakesley, B.M.J. i./21,619.

A stock solution of mercury oxycyanide 1 in 30 may be made. One drachm of this to 1 pint of water a good irrigant for the urethra. —F. Kidd, B.M.J. i./24,698.

P1 **Mercury Oxycyanide Solubes** are prepared 0·2 Gm. each, 1 in 2 litres gives 1 in 10,000 ; 1 in 1 litre—1 in 5,000 ; 1 in 40 Cc. 0.5%.

P1 **Mercury Oxycyanide Lotion Sterules** contain 8·75 grains. Each diluted to 1 pint makes 1 in 1,000 solution, to 1 quart makes 1 in 2,000 solution, 1 in 5 pints makes 1 in 5,000 Solution.

0·2 Gm. per litre (1 in 5,000) as a lotion for cleansing the glans and meatus prior to lavage in gonorrhœa.—Pr., Oct., '10, p. 417. *Iodides should be excluded from a patient so treated.*

Hypopyon ulcers treated by subconjunctival injections.—T. L. de Courcy, B.M.J. ii./21,737 *Cf.* Injectio Hydrargyri Cyanidi.

P1 **Pasta Hydrargyri Oxycyanidi, L.H.**

Mercury Oxycyanide 24 grains, Tragacanth 192 grains, Glycerin 4 ounces, Water to 20 ounces. To be sterile and free from air bubbles.

A proposed **anti-venereal prophylactic** consists of Mercury Oxycyanide 0·66 Gm., Potato Starch 40 Gm., Glycerin 50 Cc. and water to 500 Cc. The jelly formed should be heated on a water-bath for 1 hour. Stated to have a coefficient greater than 1 in 3 Phenol.—J. L. Priston and R. C. Frederick, Jl. R.N.M.S., Oct. '26,283.

P1 **Mercuro-Zinc Cyanide.** LISTER'S ANTISEPTIC. A white powder usually supplied tinted with **Rosalane** (Mauveine Hydrochloride), obtained by precipitation from a cold saturated solution of the cyanide of mercury and potassium by adding a cold saturated solution of zinc sulphate in equi-molecular proportions, or by adding in similar solutions mercuric chloride to zinc and potassium cyanide. The maximum percentage of mercuric cyanide found is 38·5, and the body may be described as a trizincic monomercuric octacyanide—

$Zn_3\ Hg(CN)_8 = 604{\cdot}814$.

It should contain at least 20% Mercury Cyanide, $Hg(CN)_2$. If carefully made can be produced containing 25%.

Estimation process by reduction with hypophosphorous acid.—D. B. Dott, P.J. i./13,98; C.D., Jan. 25, '13.

Lister—The Investigator and Surgeon.—Following on Lister's migration to London (and the Carbolic Spray day), he tried many gauzes treated with preparations of Mercury, but they had to be discarded on account of irritation, until the Double Cyanide of Zinc and Mercury was suggested (by the late W. Martindale). This is unirritating and is effective.—W. Watson Cheyne, B.M.J., i./25,923.

Lister first used (undiluted) carbolic acid in an operation on August 12th, 1865. Many other antiseptics achieved temporary popularity. Lister tried the Mercurial Salts and in February 1886 the late William Martindale suggested to Lord Lister Mercuric Cyanide. Lister subsequently tried Mercury and Potassium Cyanide, but this in common with others was irritating. Finally the late William Martindale suggested the double Cyanide of Mercury and Zinc which gave Lord Lister entire satisfaction.—"Chemicus," P. ii./15, 325. See also B.M.J. '93, Feb. 18, and B.M.J. i./07,795.

A Link with Lister.

Harvey G. Kay, John C. Umney and James Hunter, assisted the late W. Martindale in the pioneer work of devising a press for the even distribution of Sal Alembroth, 'Cyanide' and other antiseptics in the dressings, working under the personal supervision of Lord Lister at 10, New Cavendish Street, London W.—W. H. M., P.J. i./27,616.

LISTER CENTENARY, Edinburgh, 1927.—B.M.J., ii./26,703.

See also Special No. of B.M.J., Apl. 9/27, p. 653 and L. i./27.773–786.

Solubility.—Very slightly in water, more so in dilute acids.

Sterilisation.—It is unnecessary to sterilise Double Cyanide Dressings.

P1 **Mercuro-Zinc Cyanide Gauze** 3% is a popular dressing for applying direct to wounds. It is not so irritant as some of the other mercurial dressings and has the advantage of keeping well without the mercurial salt becoming reduced by the cotton. It is supplied in 1, 2, 6 and 12 yard pieces and with cotton wool tissue in 1lb. packets. It is damped before use with 1 in 20 Carbolic Acid solution. Cotton wool, as also bandages, contains 3%.

For suppurating abrasions, boils and skin affections in war *Dry* Cyanide Gauze covered completely with plaster excellent and rapid. No solution or other antiseptics used.—G. Home, B.M.J. i./16,14.

For visible clean wounds it is good. To be removed by Hydrogen Peroxide when too adherent.—Casualty Clearing Station experience. —A. Don, B.M.J. i./16,648.

P1 **Mercuro-Zinc Cyanide Cream** may be made by triturating the powder with carbolic lotion, 1 in 20, *q.s.*, for applying to hairy parts adjacent to wounds.

P1 **Mercuro-Zinc Cyanide Paste.** Mercuro-Zinc Cyanide 400, Tragacanth 2, Phenol 20, Water 800, mix. For a first dressing for wounds. *Caution: Not to be supplied in metal tubes—especially must not come in contact with lead as poisonous Lead Cyanide will be formed*—L. i./15,426. *To insure a thin surface which will immediately dry, the paste must be rubbed on in as thin a layer as possible.*

P1 **Lotion of Mercuro-Zinc Cyanide** of strength 1 in 5,000 to 1 in 1,000, is used for wounds. *Caution: Shake bottle—not dissolved.*

P1 **Unguentum Hydrargyri et Zinci Cyanidi, R.O.H.** 1 or 2 in 100 of Soft Paraffin or Lanolin. For syphilitic sores and eczema, also excellent for burns and for granular eyelids. *Caution: Preferably not in collapsible tubes,* cf. *above.*

Ⓟ**Hydrargyri Iodidum Rubrum** (*B.P.* '14). *Syn.* **Mercury Biniodide, Mercuric Iodide,** $Hg I_2$=454·474.

Dose.—$\frac{1}{32}$ to $\frac{1}{16}$ grain (**0·002 to 0·004 Gm.**) FR. CX.: *Max. single dose* $\frac{1}{3}$ grain; max. during 24 hours $1\frac{1}{4}$ grains approximately.

Intravenously.—$\frac{1}{12}$ grain (0·005 Gm.) in 75 minims (5 Cc.) is usual, but $\frac{1}{2}$ grain (0·03 Gm.) in 150 minims (10 Cc.) has been given. —*See* R. L. Spittel's formula.

Ⓟ**Pills and Tablets** contain $\frac{1}{50}$, $\frac{1}{36}$, $\frac{1}{24}$, $\frac{1}{16}$, $\frac{1}{12}$, and $\frac{1}{8}$ grain.

Red powder or crystals, ***soluble*** in solutions of other iodides, notably potassium iodide, and in solution of mercuric chloride, forming double salts *cf.* Mercuric Potassium Iodide; also 1 in 25 of castor oil, or 100 parts of the latter will dissolve 8 of this iodide with 5 of perchloride of mercury, about 1 in 200 ether, in alcohol 1 in 300.

Uses.—A powerful antiseptic, less irritant than Mercuric Chloride. As a lotion for the hands or eye wash 1 in 5,000. For wounds 1 in 7,000, vaginal douche 1 in 10,000.

Mercuric Iodide Estimation by dissolving in Sodium Thiosulphate solution (Eder and Ulm's observations).—J. Sandilands, P.J., i/26,357,

Ⓟ**Biniodide Spirit Lotion** 1 in 1,000.

For gonorrhœa dilute solutions are used, also as a pigment or spray for throat in scarlatina and diphtheria.

War Wounds. Acts like hypertonic Saline in producing free discharge and requires frequent changing. Not so painful as iodine.—Casualty Clearing Station criticism.—A. Don, B.M.J. i./16,648.

Ⓟ**Injectio Hydrargyri Biniodidi** (pro vagina).

Mercuric Chloride 8 grains, Potassium Iodide 24 grains, Water to 1 ounce. 1 drachm of this to a pint makes 1 in 10,000 approx.

Ⓟ**Unguentum Hydrargyri Iodidi Rubri** (*B.P.* '14). Strength 1 in 25.

For tinea may be applied to small spots, but not to large surfaces. **Too strong for general use on the skin. Exophthalmic goitre has been treated by daily use of this ointment half strength.**

PARENCHYMATOUS GOITRE best treated by dilute Mercuric Iodide Ointment locally—probably due to the excretion of some of the Mercury into the alimentary canal. In this affection treatment is mainly symptomatic. Improve patient's general condition and comfort. It does not cure the disease —no one pretends it does.—D. J. Harries, B.M.J. i./23,555.

Ⓟ**Injectio Hydrargyri Iodidi Rubri Hypodermica** (RAGAZZONI).

Dose.—2 to 6 minims (0·12 to 0·4 Cc.).

Mercuric Iodide 1 grain, Sodium Iodide *q.s.*, in 64 minims.

In syphilis can be used in large doses, but is painful.

Ⓟ**Sterules, Hypodermic,** contain $\frac{1}{12}$ grain in 8 minims for a dose.

Ⓟ **Injectio Hydrargyri Iodidi Intravenosa** (R. L. SPITTEL).

Dose.—120 to 180 minims (8 to 12 Cc.).

Mercuric Iodide 3·24 Gm., Sodium or Potassium Iodide 28·42 Gm., N/1 Sodium Hydrate Solution 40 drops or *q.s.*, Water to 1,000 Cc. The solution is rendered carefully neutral using Phenolphthalein, the soda being added last. Often a single injection will produce an effect as phenomenal as Salvarsan. Used in conjunction with latter in syphilis.—L. i./20,378. *Caution. —An average dose of this contains* 0·03 *Gm.* (*$\frac{1}{2}$ grain*). The amount of caustic soda in the formula in the *Lancet* paper was unnecessarily large; we have given the amount needed, after experimenting.

Ⓟ **Collapsible Tubes** of Mercuric Iodide Ointment 1% with catheter attachment are useful for the treatment of gonorrhœa.

ⓅOLEUM HYDRARGYRI BINIODIDI. *Syn.*—HUILE D'IODURE MERCURIQUE. FR. CX.

Dose.—15 minims (1 Cc.) containing approx. $\frac{1}{16}$ grain (0·004 Gm.)

Mercuric Iodide 4, Olive Oil purified and sterilised, 920 by weight. Dissolve at not exceeding 60° C.

P1 **Pilula Arsenii et Hydrargyri Iodidi.**

Dose.—1 or 2, two or three times a day.

Arsenious Iodide, Mercuric Iodide, of each 1 grain, Distilled Water *q.s.* to dissolve, Sugar *q.s.* to make 12 two-grain pills (or 1 Gm. of each Iodide in 180 pills). May be combined with 2 grains of Iodide of Iron.

Ⓟ**Wool, Mercuric Iodide.** $\frac{1}{4}$%.

Impregnate Absorbent Wool 400 under pressure with a Solution of Mercuric Iodide 1 and Potassium Iodide 1, and spread out to dry.

Ⓟ**Hydrargyri et Potassii Iodidum.**

$HgI_2KI, 1\frac{1}{2} H_2O = 647{\cdot}526$.

MERCURIC POTASSIUM IODIDE, commonly known as *Biniodide* ' when referring to Antiseptic Lotions,—made with the double salt. '*Biniodide' is, however, a common synonym for Mercuric Iodide.*

Dose.—$\frac{1}{16}$ to $\frac{1}{4}$ grain (**0·004 to 0·016 Gm.**) in pill.

Antidotes.—Olive Oil, Milk, White of Egg, Petroleum Emulsion, warm draughts to encourage vomiting,—later Bismuth and Morphine.

Manufacture.—Dissolve Mercuric Iodide 45, Potassium Iodide 16½ (*i.e.*, approximately equimolecular proportions) in water 30, boiling the mixture for a few minutes, allowing to cool for pure Mercuric Iodide to crystallise out, filter and concentrate the filtrate. Collect the first crop of crystals, rejecting later portions which contain excess of Potassium Iodide. Another method is to use Alcohol 90% 20 instead of the water above mentioned, boil the salts with the Alcohol until almost entirely dissolved and crystallise.

Solubility.—This Salt is not soluble in water except in presence of Potassium Iodide, *i.e.*, sufficient at least to produce the body $HgI_2 2KI$; in other words, the theoretical amount (170 approximately) of Potassium Iodide must be added to 647 (approximately) of the double Salt,—this can be easily shown by experiment, but even an excess of this quantity is desirable in tablet making.

Brought into contact with water, 2 ($HgI_2KI.1\frac{1}{2}\ H_2O$) decompose into $HgI_2 2KI = 785{\cdot}930$ and HgI_2 (+Aq.). It is, therefore, impossible to prepare soluble Antiseptic Tablets of this substance alone.

The body $HgI_2 2KI$ is also formed in solution, when three times the weight of Potassium Iodide, as of Mercuric Chloride, are dispensed altogether,—theoretically the proportion is 2·45 to 1, thus:—

$$HgCl_2 + 4KI = HgI_2,2KI + 2KCl$$

and this will produce the desired antiseptic effect providing the Potassium Iodide be pure. It makes no difference whether the Potassium Iodide is added to the Mercuric Chloride or *vice versa.*—P.J. ii./06,533,557.

Soluble also in Alcohol 90% 1 in 1 (without decomposition), 1 in 1 in Ether, and about 1 in 2 Glacial Acetic Acid.

For Ⓟ **Nessler's Solution** *v. Vol. II.*

Ⓟ**Mistura Hydrargyri Biniodidi,** K.C.H.

Dose.—1 ounce (**30 Cc.**).

Solution of Mercuric Chloride 30 minims, Potassium Iodide 10 grains, Ammonium Carbonate 5 grains, Decoction of Cinchona (B.P. '85) to one ounce.

Ⓟ**U.C.H.** has Solution of Mercuric Chloride 60 minims, Potassium Iodide 4 grains, Water to one ounce. Ⓟ**St. M.'s H.** is identical in strength in Mercuric Chloride. Ⓟ L.H. is Solution of Mercuric Chloride 1 drachm, Potassium Iodide 5 grains, Peppermint Water to ½ ounce, *i.e.* it is double the strength.

Uses.—The mercury in these mixtures is more rapidly eliminated than when given alone. The potassium iodide acts as a diuretic. Does not commend itself.—G. Pernet, B.M.J. i./07,730.

For the combined mercury and arsenobenzol treatment, *vide* p. 199, also Salvarsan by M. and W. Many authorities now advise this.

Keloid well treated by the mixture. The arms of the patient (who had contracted syphilis seventeen years previously) became ulcerated and subsequently the keloid developed. Treatment with Biniodide Mixture in a short time proved of value.—P.R.S.M., Nov./10.

Ⓟ **Pilula Hydrargyri Iodidi Rubri** ($\frac{1}{8}$ grain) **et Potassii Iodidi** (**4 grains**). *Dose.*—1 twice daily.

Ⓟ**Soaps** containing respectively 3, 1 and $\frac{1}{2}$% of Mercuric Iodide are prepared. Useful for eczema, acne, scabies, ringworm and desquamation after fevers.

Ⓟ**Unguentum Hydrargyri et Potassii Iodidi.**

Mercuric Iodide 1, Potassium Iodide 1, Water 13, Lard 35, Hydrous Wool Fat 50. B. S. H. has 5 grains each of the salts, Water *q.s.*, Lard 1 ounce.

Ⓟ ***'Solubes' Biniodide.**

Contain the equivalent of Mercuric Potassium Iodide 8·75 grains One in 1 pint of water forms a solution of the strength of 1 in 1,000—suitable for wounds. For lotions and instruments this may be diluted with from 1 to 3 or more parts of water.

Ⓟ **Biniodide Lotion 'Sterules'** contain 8·75 grains. One diluted to $\frac{1}{2}$ pint gives 1 in 500 Solution or to 1 pint gives a 1 in 1,000 solution.

(*In Northern Ireland, Preparations of Corrosive Sublimate are in Part I of the Schedule, in addition to Mercuric Chloride as such.*) *This is of course most reasonable. Since* 1912 *we have pointed out in each Edition of the book the anomalous position of 'preparations,' e.g., a* 1 *in* 20 *Solution of Mercuric Chloride being merely in Part II.*

If a douche required in midwifery, 1 in 1,000 Biniodide always used.—A. P. Murtz, L. ii./26,728.

To our knowledge a 1 in 5,000 Biniodide uterine douche was badly tolerated after confinement. Fluid stools passed with a proportion of blood and some albuminuria. Some persons seem very susceptible to mercury.—R. T. Slinger

Ⓟ **Lotio Hydrargyri Biniodidi, L. H.**

Mercuric Chloride 3 grains, Potassium Iodide 8$\frac{2}{5}$ grains, Distilled Water to 10 ounces. Strength of double salt, 1 in 500.

Hydrargyri Iodidum Flavum. Yellow Mercurous Iodide.

$Hg_2 I_2 = 655{\cdot}084$.

Prepared by double decomposition between freshly made Mercurous Nitrate and Potassium Iodide. (Must not be confounded with the yellow variety of Mercuric Iodide). *Dose.*—$\frac{1}{8}$ grain (**0·008 Gm.**).

Pills and Tablets contain $\frac{1}{8}$ grain. Employed in syphilis.

Hydragyri Iodidum Viride. Green Mercurous Iodide, Mercury Protoiodide.

Dose.—$\frac{1}{6}$ to 1 **grain (0·01 to 0·06 Gm.)** gradually increased to 3 grains. **Pills** contain $\frac{1}{6}$ and $\frac{1}{3}$, $\frac{1}{4}$ and $\frac{1}{2}$ grain, and **Tablets** contain $\frac{1}{8}$ grain,—with opium and pepper to prevent looseness of bowels.

Incompatible with other iodides.

This salt should be kept from the light, be of yellowish-green colour, and contain slight excess of mercury ; otherwise, as the late W.M. showed, it is unstable and dangerous.

Hydrargyri Lactas, Mercurous Lactate.

$Hg_2(CH_3.CH.OH.COO)_2 = 579{\cdot}3$.

Dose.—Hypodermically $\frac{1}{8}$ grain (**0·008 Gm.**) in 15 minims (**1 Cc.**) of water per diem, *per os* $\frac{1}{5}$ grain (**0·012 Gm.**) well diluted.

A crystalline compound, containing about 65% of mercury, ***soluble*** in water, insoluble in alcohol 90%.

May be produced by mixing boiling concentrated solutions of Mercurous Nitrate and Sodium Lactate—the salt throws out with $2H_2O$ in pink rosettes.

Can also be made (white, the more usual form) by dissolving freshly precipitated Mercurous Oxide in excess of Lactic Acid with Water *q.s.* and evaporating.

As an antisyphilitic on account of its safety and solubility. It is stated to be irritating in use in trypanosomiasis.

Hydrargyri Nitras, Mercurous Nitrate.

$Hg_2(NO_3)_2.2H_2O = 561{\cdot}268$.

In colourless monoclinic crystals, generally either damp (from adhering acid) and *soluble* in water, or yellow tinted (from basic salt), then not perfectly soluble in water. Used in syphilitic sores, 1 in 30 or more, as a lotion or ointment, and occasionally internally in same dose as mercuric chloride.

Liquor Hydrargyri Nitratis Acidus (*B.P.* '14).

Used as a caustic for syphilitic warts, and lupus.

Urethral injection 1 in 1,000, or more, in gonorrhœa and for syphilitic sore throat as gargle.

The FR. CX. dissolves Mercury 100, in Nitric Acid (FR. CX.) 165 and Water 35, mixed, with slight heat, and evaporates to 225 (all by weight). Sp. Gr. 2·246.

Unguentum Hydrargyri Nitratis (*B.P.* '14).

Syn. CITRINE OINTMENT. MERCURIC NITRATE OINTMENT.

Contains about 1 of Mercury in 15 of the finished Ointment.

The Mercury Solution, by the B.P. '14 process, consists principally of mercurous nitrate before it is added to the fats. There being also an excess of acid present, the chemical action is thus intensified, and by the time the process is completed, by constant and vigorous agitation, all further chemical action will cease, and the ointment should keep of a good colour for months without generating more gases and thus becoming spongy. Its preparation requires care, skill, and attention.

For further details vide Vol. II.

Aurinarium Unguenti Hydrargyri Nitratis contains ⅓ grain of the official ointment—useful for chronic eczema of the meatus.

Unguentum Hydrargyri Nitratis Dilutum (*B.P.* '14).

Contains 20% of Citrine Ointment.

Found to separate at summer temperature. Mercuric Nitrate Ointment 1, Hydrous Wool Fat 1, Yellow Soft Paraffin 3 ; Melt the two latter with gentle heat, remove from flame and add the first and stir while cooling. Keeps well.

R.O.H. has 10% in Soft Paraffin.

In tinea tarsi of great value, employed with a brush to the eyelids, also in chronic eczema, psoriasis, and herpes preputialis.

In pustular eczema after removing crusts this checks further infection, then employ Lassar's paste and soothing lotions.

Unguentum Acidi Carbolici Compositum. V.H.C.

Mercuric Nitrate Ointment 2, Sublimed Sulphur ½, Phenol 1, Sesame Oil 1, Yellow Wax 1. L. H. has Mercuric Nitrate Ointment 2, Carbolic Acid 1, Sulphur Ointment 2.

Unguentum Metallorum.

C.X. 1917—Mercuric Nitrate Ointment, Lead Subacetate Ointment and Zinc Ointment of each equal parts.—**G.H.** is similar.

Mid. H.—same as C.X. except Dilute Mercuric Nitrate Ointment in place of Mercuric Nitrate Ointment.

Gt. Northern and King's as **C.X.**—except Lead Acetate Ointment in place of Subacetate Ointment.

Guttæ Hydrargyri Nitratis, L.H. (*Aural*). Mercuric Nitrate Ointment 1 drachm, Wool Fat $\frac{1}{2}$ drachm, Olive Oil $\frac{1}{2}$ ounce, Liquid Paraffin to 1 ounce.

Aurinaria are prepared *q.v. antea.*

Nebula Hydrargyri Nitratis, T.H.—Nitrate of Mercury Ointment 20, Soft Paraffin 20, Olive Oil 120, Liquid Paraffin 120. St. Bart.'s H. is 6%.

'Nasal Oil,' St. M's H. is Dilute Mercury Nitrate Ointment 20 grains, Menthol 2 grains, Lavender Oil 5 minims, Olive Oil to 1 ounce.

Ⓟ**Hydrargyri Peptonas.** Mercury Peptonate.

Dose per os.—$\frac{1}{2}$ grain (0·03 Gm.) increased with caution, hypodermically $\frac{1}{6}$ grain.

Brown powder containing 10% Mercuric Chloride, soluble in water. Fr. Cx. gives method of manufacture of a Solution.

$\boxed{P1}$ **Hydrargyri Perchloridum.** **Mercuric Chloride, Hydrargyri Chloridum Corrosivum, U.S.**; Corrosive Sublimate, $HgCl_2$= 271·524

(*In Northern Ireland a* ***preparation*** *of Mercuric Chloride is also in Part I—a reasonable alteration. See note p.* 465.

Dose.—$\frac{1}{32}$ to $\frac{1}{16}$ grain (0·002 to 0·004 Gm.), but in treatment it may be increased to $\frac{1}{4}$ grain. Fr. Cx.: *Max. single dose* $\frac{1}{2}$ grain. Max. during 24 hours 1 grain approximately. *Intravenously* $\frac{1}{32}$ grain increased, *v.*, p. 471.

In heavy colourless crystalline lumps or white powder.

Antidotes.—Emetics, Apomorphine, white of 1 egg for every 4 grains of perchloride, *vide* also Poisons and Antidotes at end of book. Mercurial poisoning from surgical use of Sublimate especially when left in wounds and cavities should be treated by diuretics. Stimulants for collapse and Potassium Chlorate for stomatitis.

Mercury line on gums. Distinguish from lead line, *cf.* Plumbum.

44 grains of Mercuric Chloride in the form of soluble tablets taken after a full meal,—death followed seven days after. Treatment, lavage of the stomach, antidotes, stimulants and attempts to assist elimination.—L. ii./11,297.

Recovery after 8$\frac{3}{4}$ grains taken by a man of 85. White of egg and water administered, stomach tube passed. Washed out stomach with large quantities of albumen water and milk and water. Strychnine hypodermically and milk and brandy *per os*, hot blankets and bottles. All the while bowels very irritable. During convalescence Cremor Magnesiæ and brandy in milk. Ultimate recovery.—B.M.J. i./13,116. Chronic Mercurial poisoning from prolonged use of an ointment consisting of White Precipitate, Resorcin and Camphor.—Per Clin. Jl. Nov. 21/23,562. *For further data of poisoning fatalities see 17th Edn., p.* 462.

Soluble 1 in 18 Water at 60° F., 1 in 4 of Alcohol 90% at 60° F., 1 in 4·35 Ether (0·720) at 58·5° F., 2 in 3 of Glycerin.

Neutral double salts (more soluble) are formed with Mercuric Chloride in solution on addition of Sodium Chloride, Ammonium Chloride and other Metallic Chlorides.

These solutions contain fewer Mercuric ions and are hence *less poisonous* (taking same weights of Mercury) than solutions of Sublimate. We showed that they are not more antiseptic than Sublimate. *Cf.* Data under **Uses,** also Chapter on 'Antiseptic Powers,' *Vol. II.* The late Lord Lister tried one of the Potash Compounds in his earlier work.

The *B.P.* '14 preparations are Ⓟ**Lotio Hydrargyri Flava** (0·46 to 100, or 2 grains to 1 ounce Solution of Lime), and Ⓟ**Liquor Hydrargyri Perchloridi**, 1 in 1,000 ($\frac{1}{18}$ grain in 1 drachm approx.). *Dose*, ½ to 1 dr. *Syn.* **Van Swieten's Solution, Fr. Cx.**

Incompatibles.—It precipitates most alkaloids from solutions, and should therefore not be ordered with them : the alkalis and the salts of silver and lead are attacked also. Steel surgical instruments should not be dipped in this solution. It forms insoluble compounds with albuminous fluids (*v. infra*), also incompatible with bodies containing tannin, soap, iodine and potassium iodide.

Uses.—A powerful antiseptic. 1 in 1,000 solution kills anthrax spores in 15 minutes, the bacilli themselves being killed by 1 in 15,000 in 1 minute. The growth of the bacilli in question is prevented by 1 in 500,000 strength.—Hale White. Its solution does not pass through animal membrane rapidly, *vide* Antiseptics, *Vol. II.*

Aqueous solutions 1 in 1,000 and more diluted, also Glycerin Solutions are much used as surgical dressings.

SYPHILIS.—Given in small doses, *e.g.*, $\frac{1}{16}$ grain *t.d.*, has an antiseptic intestinal action and is employed in some forms of diarrhœa of infancy.

EYE LOTIONS.—1 in 4,500 parts of water, and for lotions for the nose and mouth and for vaginal leucorrhœa the same strength is suitable. R.O.H. gives $\frac{1}{8}$, $\frac{1}{10}$, $\frac{1}{16}$, or $\frac{1}{20}$ grain per ounce of water for eye lotion.

GONORRHŒA and GLEET.—A lotion 1 in 4,000 to 1 in 2,000 is recommended.

EAR DISCHARGES.—Syringing with 1 in 10,000 is antiseptic.

CHOREA has been treated. Also in paresis, and varicose veins.

CATARACT OPERATIONS.—576 cases, low percentage of eyes lost by suppuration was due to use of 1 in 2,000 Perchloride douche in conjunction with 4% Cocaine solution.—L. ii./09,1129.

STOMATITIS.—If the surface epithelium is shed the mucous membrane may be brushed with 1 in 5,000 Sublimate solution.

SYPHILITIC TREATMENT DURING MARRIAGE. The results of Mercury before 1905 (Wassermann Test), especially during pregnancy in the form of Sublimate, 1/16th grain thrice daily, were sufficient almost always to ensure a healthy child.—Amand Routh, B.M.J. i./23,632.

PRICKLY HEAT has been treated by rubbing in a lotion of 1 in 1,000 of water containing Hydrochloric Acid (strong) 2. Allow to dry on. If skin tender, wash off again after a few minutes. Usually cures in a couple of days. Repeat if necessary.

PUERPERAL INFECTION.—Irrigation with 1 litre of 1 in 1,000 Sublimate Lotion in 500 cases compared with 500 in which there was no vaginal disinfection ; 12·8% of the former had fever, whilst only 8% of the undisinfected had it. Deducting those who had fever not originating from the genitalia there remained 5·2% with fever, among the non-disinfected, and 10% among the disinfected. Analogous results by disinfection with Lactic Acid. These results, opposed as they are to fundamental views of antisepsis, are explained by assumption that the hand used in examining is the principal source of infection. Recommendation to employ gloves (specially thin).—B.M.J. ii./10,1222.

PNEUMOCOCCAL EMPYEMA.—Irrigation of the pleural cavity with 1 in 40,000 Mercuric Chloride, in treatment. (1 in 20,000 kills the pneumococcus in 2 hours—Choyce's Surgery).—F. J. Hathaway, B.M.J. i./25,632.

For further references to the use of Mercuric Chloride, v. p. 471.

Ⓟ**Glycerinum Hydrargyri Perchloridi,** U.C.H., is 0·1%. L.H. the same strength, *viz.*, Mercuric Chloride 17½ grains, Distilled Water 6 drachms, Glycerin to 2 pints, tinted blue with *Liquor Cæruleus*, which contains Turquoise Blue 4 grains in Distilled Water 1 ounce. Distinguish from the following :

Ⓟ**Glycerinum Hydrargyri Perchloridi Alcoholicum,** U.C.H.—Mercuric Chloride 35, Glycerin 50, Methyl Blue 0·05, Methylated Spirit to 100. *For disinfecting Urine.* **Caution.**—Not for administration.

Ⓟ**Lint, Absorbent Wool, Gauze,** or **Wood Wool,** *q.v.*, may be impregnated with $\frac{1}{2}$% of each, Corrosive Sublimate and Glycerin.

Ⓟ**Mistura Hydrargyri Perchloridi, E.L.**—Solution of Mercuric Chloride 10 minims, Water to 1 drachm.

Ⓟ**Mistura Hydrargyri Perchloridi Composita.**

Dose.—$\frac{1}{2}$ ounce (15 Cc.) in a little water in syphilis thrice daily 30 minutes after food, for adult males.—(*Caution.*=$\frac{1}{4}$ grain Sublimate per dose); females half the dose.

Mercuric Chloride 4 grains, Potassium Chlorate 1$\frac{1}{2}$ drachms, Ammonium Chloride 3$\frac{1}{2}$ drachms, Compound Tincture of Cardamoms 1 drachm, Simple Syrup 1 ounce, Water to 8 ounces. The Perchloride (= $\frac{1}{4}$ grain per dose) is tolerated by the addition of the other salts. In syphilis the dosage, as stated, has given valuable results.—J. Bain, B.M.J. ii./12,496.

Ⓟ **Gargarisma Hydrargyri Perchloridi,** (1 in 1,800). Mercuric Chloride $\frac{1}{4}$ grain, Hydrochloric Acid 1 minim, Glycerin 30 minims, Water to 1 ounce.

R.O.H. has 1 in 4,000 without added Acid.

For influenza, sore throat, especially quinsy, Solution of Mercuric Chloride 1, Acid Infusion of Rose Petals 1. One tablespoonful in a teacup of hot water as a gargle.

Ⓟ**Lotio Hydrargyri Acetica.**

Mercuric Chloride 1, Acetic Acid 75, Glycerin 75, Alcohol (90%) 250, Rose Water 500. To destroy pediculi and detach their ova.

Tinea has been destroyed by 3 grains dissolved in an ounce of Spirit of Nitrous Ether.

Ⓟ**Lotio Hydrargyri Perchloridi, U.C.H.,** Mercuric Chloride 0·2% coloured with Turquoise blue. L. H. is 1 in 1,000.

Ⓟ**Lotio Hydrargyri cum Acido Carbolico, E.L.**—For pediculi, Solution of Mercuric Chloride 1, Dilute Acetic Acid 2, Turpentine Oil 6, Phenol Solution (1 in 40) to 24.

Ⓟ**Lotio Parasiticida, St. M.'s H.**

Mercuric Chloride $\frac{1}{4}$ grain, Acetic Acid 2 drachms, Water to 1 ounce.

Ⓟ**Lotio Hydrargyri cum Oleo Terebinthinæ, U.C.H.**

Mercuric Chloride 0·6, Methylated Spirit 12$\frac{1}{2}$, Turpentine to 100.

Ⓟ**Pigmentum contra Tineam.**

Mercuric Chloride 1, Salicylic Acid 9, Phenol 10, Glycerin 80. Efficient in ringworm.

Lotion for alopecia syphilitica,—Mercuric Chloride 3 grains, Acetic Acid 5 minims, Alcohol 90% 8 ounces. Apply with a tooth brush night and morning. Use also Pomade each evening.—Calomel 15 to 30 grains, Salicylic Acid 8 grains, Vaselin 1 ounce.—B.M.J. ii./10,180.

Ⓟ**Mackenzie's Eye Wash.**

Sublimate 1, Ammonium Chloride 6, Belladonna Extract 10, Coccus Cacti 1$\frac{1}{2}$, Proof Spirit 55; rub together and add Water to 330. Mix with equal parts of boiling water to bathe the eyes.—*Caution.—This is about five times as strong as usually employed.*

Ⓟ**Pills** contain $\frac{1}{40}$, $\frac{1}{32}$, $\frac{1}{20}$, $\frac{1}{16}$, and $\frac{1}{12}$ grain.

𝔇 𝔓1 **Pilules de Chlorure Mercurique Opiacées. Dupuytren's Pills**—Fr. Cx.

Mercuric Chloride 1, Opium Extract 2, Extract of Agropyrum 2 (Extrait chiendent), Licorice Powder *q.s.* Each pill contains Mercuric Chloride 0·01 Gm. and Opium Extract 0·02 Gm.

Ⓟ**Ophthalmic discs** contain $\frac{1}{100,000}$ grain of Sublimate.

Ⓟ **Liquor Hydrargyri Antisepticus W. H.** *Syn.* **Sublimate Disinfectant.**—*Local Government Board.*

Sublimate ½ ounce, Hydrochloric Acid 1 ounce, Soluble Aniline Blue 5 grains, Water 3 gallons.

Ⓟ**Perchloride** ✱**'Solubes'** are made of three sizes, combined with Sodium Chloride, and coloured blue. They are convenient for surgical purposes, the *largest* containing 17½ grains, making 20 ounces, 1 in 500; the *next smaller* containing 8·75 grains, for 20 ounces of lotion, 1 in 1,000. These may be further diluted with from one to three or more parts of warm water. See strengths of solutions for use, *infra.* The *smallest* (½ grain) produce a solution of 1 in 4,500 when dissolved in a tumbler of warm water, suitable for ophthalmic work.

Ⓟ**Perchloride Lotion Sterules** contain 8·75 grains. Each diluted to 1 pint with water makes a pint of 1 in 1,000 solution.

Regarding the anomaly of a Solution or other dilution of Mercuric Chloride being a Ⓟ *poison, see pp.* 465, 467.

(✱'Solubes' (T.M. 254730) signify material for making solutions for external or local use. A list is given in the Index.)

Strengths of Perchloride Solutions for use :—

Solutions 1 in 10,000 to 1 in 1,000 may be used for infected linen, the walls and floors of infected rooms, the hands of surgeons and gynæcologists, and as a lotion to superficial wounds. For continuous applications 1 in 10,000 forms an active lotion, but 1 in 500 is the minimum strength (with acid added) for use to disinfect excreta, *cf.* Sublimate Disinfectant *antea.*

There is risk of poisonous effects from vaginal injections of 1 in 1,000; watch for the occurrence of diarrhœa.

Ⓟ **Harrington's Solution.**

Mercuric Chloride 0·8 Gm., Water 300 Cc., Hydrochloric Acid 60 Cc., Alcohol 90% 640 Cc. A powerful antiseptic preparation for sterilising the skin before operation.

Ⓟ**'Hydrion' Tablets** contain Mercuric Chloride 4·375 grains, Calcium Chloride 1·86 grains, Sodium Chloride 34·76 grains, Potassium Chloride 0·075 grains, one of which dissolved in a pint of cold water makes an antiseptic solution used with good effect for recent wounds on the hands, feet, head and exposed parts generally. Suggested also for battlefield wounds. The solution is used somewhat weaker on delicate skins, and much stronger in the first immersion of a very dirty wound. The tablets are very hygroscopic and must be kept dry.—Thomas Lissaman, L. ii./14,1438.

Ⓟ**Sublimate–Spirit** ***for Skin Sterilisation.***

Alcoholic Solution of Mercuric Chloride, 1 in 1,000 of 70% Alcohol, is more bactericidal than Tincture of Iodine, and suitable Aqueous Solutions of Sublimate.

A criticism of Mercuric Chloride, Iodine, Picric Acid and Mercurochrome as skin antiseptics.—J.A.M.A. ii./26,1347; P.J. ii./26,677.

Ⓟ C.H.W. has **Injectio** 1 in 4,000 and **Injectio Fortior** 1 in 2,000, as vaginal douching for use in labour.

Ⓟ **Tablets,** $\frac{1}{100}$, $\frac{1}{32}$, $\frac{1}{16}$ and $\frac{1}{10}$ grain are for internal administration.

Ⓟ **Hypodermic Tablets,** $\frac{1}{60}$, $\frac{1}{50}$, $\frac{1}{30}$ grain.

Ⓟ **Wool, Perchloride** (' **Sublimate** ') 2%.

To prepare, impregnate Absorbent Cotton 100 with 200 of a solution of 'Perchloride' 4 and Glycerin 2, press to 200 and dry it spread out. Weaker strengths can be prepared on the same lines with less Perchloride.

Ⓟ **P. Jap. IV.** uses Mercuric Chloride 2, Potassium Chloride 2, Water 1,500, Wool 1,000, *i.e.*, 0·2%. Faintly coloured with Scarlet or Fuchsin 'S.'

Sublimate-Malachite Green Solution.

A useful non-irritant solution.—*See* **Malachite Green.**

Ⓟ **Unguentum Desinficiens** (NEISSER–SIEBERT) **P. Svec. X.** Triturate Tragacanth 20 Gm. and Wheat Starch 40 Gm. with Glycerin 170 Gm. Dissolve separately Gelatin 7 Gm. in warm water 500 Cc. and add Mercuric Chloride 3 Gm. and Sodium Chloride 10 Gm. to this solution. While still warm add with stirring the Tragacanth, etc., mixture. Warm on water bath until homogeneous. When cool add Alcohol 90% 250 Gm. in small lots.—Swedish Medical Board, C.D. August 5/22, p. 204.

References.

LUPUS, in initial stage, subcutaneous injection of 1% solution into affected tissue has been used.

EMPYEMA, three tappings and two injections of $\frac{1}{4}$ grain Perchloride in $2\frac{1}{2}$ ounces of water with improvement.—B.M.J. i./03,78.

GLOSSITIS treated by a mouth-wash of Mercuric Chloride 2 grains, Hydrochloric Acid 8 minims, Glycerin $\frac{1}{2}$ ounce, Water to 8 ounces.—B.M.J. i./11,536.

FISTULÆ.—Wool soaked in 1 in 2,000 Solution of Sublimate is the best dressing.—B.M.J. i./11,1048.

BILHARZIASIS (endemic hæmaturia).—Associated with this disease is almost invariably the appearance of blood and pus in the urine. Mercuric Chloride intravenously has been given with good results.

Emetine Periodide and Auremetine (*q.v.* for further notes on treatment) have been successful.

Intravenous Injection of Perchloride. Typhoid treated. Dose employed was 0·01 Gm., but 0·02 Gm. (Caution !) has been used in syphilis.—B.M.J.E. i./09,28.

ACUTE BACTERIAL INFECTIONS, *e.g.*, pneumonia, well treated by intravenous injections of $\frac{1}{32}$ or $\frac{1}{16}$ grain.—J. Burnford, L. i./26,312.

Syphilis, septicæmic conditions, influenzal pneumonia, treated intravenously with $\frac{1}{8}$ grain doses, increased every other day. Nephritis a contraindication and saline cathartics must not be used.—H. Schussler, Jl. Intrav. Therap., Jan. '25,11.

Bacterial infection, 330 cases treated with Mercuric Chloride or Mercurochrome, or both. 5 Cc. of a 1 in 1,250 solution of Mercuric Chloride ($\frac{1}{16}$ grain) in saline as a first dose, repeated if necessary in 12 to 24 hours, according to patient's condition. Maximum dose 7 Cc. Solution freshly prepared and injected directly into a vein. Among the complications cited are thrombosis, diarrhœa, stomatitis, and nephritis.—L. S. Dudgeon, L. i./26,169.

PNEUMONIA, lobar and lobular, acute staphylococcic infections, chorea and subacute rheumatism, chronic infective arthritis of undetermined origin and encephalitis lethargica. Mercuric Chloride intravenously in doses of

$\frac{1}{64}$ grain to $\frac{1}{16}$ grain is very useful, *e.g.*, $\frac{1}{16}$ grain in Normal Saline 8 Cc. Intestinal irritation may occur.—H. Pritchard, B.M.J. i/27,794.

Injectio Hydrargyri Perchloridi (Intravenous) Gt. Orm. H. contains 1/40 grain (0·0015 Gm.) in Normal Saline 85 minims (5 Cc.) for children under 2 years. For older children 1/30 grain (0·002 Gm.) in the same volume. May be repeated on three successive days.

Primary syphilis has been treated by Iontophoresis of a 2% solution. *Vide* **Iontophoresis.** Vol. II.

MALIGNANT PUSTULE well treated by use of sublimate as dusting powder without incision or excision. An opening a little larger than the pustule is cut in the centre of a piece of plaster, and this is applied so that the pustule appears through the hole. Sublimate is then applied to the pustule so as to cover it entirely, and the opening is covered with another piece of plaster. After 24 hours the dressing is removed. The eschar formed detaches itself in about ten days.—Insterstate Med. Jl., April, 15, per Pres. It has also been treated by hypodermic injection of 1 in 1000 solution.

ⓅSal Alembroth.—*Syn.* **Ammonio-Mercuric Chloride.**

$HgCl_2.2NH_4Cl,H_2O = 396{\cdot}534.$

A powerful antiseptic, but does not combine with albumin quickly and hence is not very irritating. ***Uses***—In medicating dressings ⓅBANDAGES, ⓅGAUZE, ⓅWOOL GAUZE, and ⓅWOOL TISSUE, 1 or 2% (which are dyed blue), also as an intramuscular injection for syphilis. (*Dose,* 10 minims of 5% solution. Painful. Slowly eliminated.)

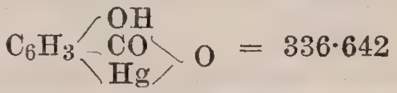
Soluble 2 in 1 of Water, 1 in 4 of Alcohol 90%, also in Glycerin.

Hydrargyri Salicylas.

Dose.—$\frac{1}{3}$ grain (**0·02 Gm.**) (internally). This in our opinionmay be regarded as a maximum single dose. Intramuscularly $\frac{1}{10}$ grain in 10 minims Liquid Paraffin, increased up to 1 grain. (Cocaine Salicylate may well be added.)

Manufacture.

When produced by the interaction of Mercury Oxide and Salicylic Acid, the chief constituent is Anhydro-hydroxy-Mercuric-Salicylic Acid of formula



$$C_6H_3{<}\begin{matrix}OH\\CO\\Hg\end{matrix}{>}O = 336{\cdot}642$$

P.G. VI gives the maximum single dose of this compound as $2\frac{1}{2}$ grains (0·15 Gm.), while P.G.V. gave $\frac{1}{3}$ grain (0·02 Gm.). It is also official in P. Ital. IV.

A white powder containing about 59% of mercury, very slightly ***soluble*** in water (but soluble in solutions of sodium hydrate and sodium carbonate), scarcely soluble in alcohol 90%. ***Used*** as an antiseptic and antisyphilitic and as a dusting powder or ointment for sores. Should not be given in large doses with potassium iodide.

This is the basic mercuric salicylate as distinguished from the neutral or normal salt (*vide* below). Hydrogen sulphide distinguishes easily, the normal salt is precipitated at once, this one slowly Two mercurous salts are known.

As an injection for gonorrhœa 15 minims of a mucilage suspension 1—300 has been used.

Three to four injections intramuscularly in 10—14 days of 10 minims of 1% suspension of Mercury Salicylate in Liquid Paraffin gave excellent results in Bell's palsy.—P. A. Harry, Pres., Aug. '26,290.

Local skin affections well treated with Mercury Salicylate in Liquid Paraffin injections intramuscularly, 1 grain per Cc. dose.—W. A. Elliott, B.M.J. i./25,551.

The injection of Mercury Salicylate intramuscularly artificially induces leucocytosis. This accounts for its beneficial action in certain cases of syphilis, in furunculosis and small infected wounds, and in trachoma. One to three injections often give good results in asthma, hay fever, arthritis, bronchiectasis, and skin complaints. Encephalitis lethargica well treated by 4 injections, each of 1 grain of Mercury Salicylate in oily suspension.—Burr Ferguson, L. i./25,1292.

In rabbits, Mercury Salicylate appears to be more rapidly absorbed when in oily suspension, in which instance its lethal dose is 0·03 Gm. per kilo.—Jl. Ph. & Exp. Ther., June '26,388.

Sterules of Mercury Salicylate, $\frac{1}{10}$ to 1 grain in 1 Cc. of Liquid Paraffin, are made.

Hydrargyri Salicylas, Neutrale. $(C_6H_4.OH.COO)_2Hg=474{\cdot}69$.

Dose.—Hypodermically $\frac{3}{10}$ to 1 grain suspended 1 in 10 in Liquid Paraffin. Comparatively non-irritant.

Quinine Urea (2%) added to the injection relieves pain—thus the injection may be made as follows:—

Quinine Urea 2, Water 2, solve and mix with Anhydrous Wool Fat 20. To this add Mercuric Salicylate 10, Liq. Paraffin *q.s.* to 100.—Pres., Oct., 1912.

PROPHYLAXIS OF SYPHILIS. The following jelly in collapsible tubes, Neutral Mercury Salicylate 10, Irish Moss 5, Water 85, according to Beddoes is used for smearing over the parts, it is not too strong for use to the tongue and other mucous surfaces. *N.B.—With caution.*

Mercurosal. *Syn.* DI - SODIUM - HYDROXY - MERCURI - SALICYL - ACETATE
$C_6H_3COONa.OCH_2COONa.HgOH. = 456{\cdot}652$.

Dose.—¾ grain (**0·05 Gm.**) intramuscularly. 1½ grains (**0·1 Gm.**) intravenously in 5 Cc. of water. A white powder freely soluble in water. Used in syphilis intravenously it does not irritate veins. It is less toxic than Mercuric Chloride.

Hydrargyri Subchloridum, Mercurous Chloride. *Syn.* CALOMEL, **Mercurius Dulcis, Ph. Ned. V.** $HgCl=236{\cdot}103$.

Hydrargyri Chloridum Mite. U.S. *Syn.* PRÉCIPITÉ BLANC (distinguish from British White Precipitate).

Dose.—½ to 5 grains (**0·03 to 0·3 Gm.**). U.S., *average laxative* 2½ grains. FR. CX. has maximum single dose 15 grains, maximum during 24 hours, 15 grains.

Heavy white powder. We have also prepared it as *small, soft, scaly crystals* for eye work. **The Finely Divided Calomel of Duret** (Vol. II.) is similar to this.

Insoluble in water, ether or alcohol.

Incompatible with acids, alkalis (*see* Lotio Nigra p. 475, with sodium and potassium chloride and with bromides, iodides, sulphur, cherry laurel water, and antipyrin.

With regard to Calomel and Sodium Chloride, the usual view is that Mercuric Chloride may be formed. We know a case of a young man remarkably fond of salt who took 2 grains of Calomel after a big dinner. He was exceedingly ill and an emetic was necessary.

Taken internally, it is converted into Mercury Sulphocyanide with traces of Mercury-Albumin compounds. Since the solubility of Mercury Sulphocyanide is markedly increased by alkali chlorides, salt should be withheld from patients taking Calomel.—P.J. ii./10,438.

Uses.—Alterative and purgative. Was always considered a cholagogue, but at the present time is thought to empty the gall bladder only, not to increase the actual amount of bile formed. Most useful purgative for congested liver and dyspepsia generally. To be given at bed-time, followed by morning saline draught. Useful where there is intestinal putrefaction, *e.g.*, in dysentery, fæcal accumulation, typhoid. For torpid liver $\frac{1}{4}$ grain doses hourly valuable. As dusting powder to ulcers and many skin diseases (but not to the cornea of the eye if Potassium Iodide is being given). Applied dry relieves pruritus ani.

In optic neuritis weekly injections of $\frac{3}{4}$ gr. have been successful.

GALL STONES are often expelled after large doses of Calomel followed by Castor Oil.—Whitla, Pract. Med.

NEURASTHENIA AND NEURALGIA.—Intestinal antisepsis is required, Calomel may be useful.

ASTHMA is relieved by $\frac{1}{2}$ to 2 grain doses. Give $\frac{1}{2}$ grain at feeling of onset of attack.—B.M.J. ii./09,882.

VIOLENT MANIA.—Calomel 30 grains administered to a violent maniac slightly under the influence of Chloroform subdued the patient after effecting profuse purging and vomiting. The patient slept and woke in a perfectly calm frame of mind.—Murray.—"Rough Notes on Remedies," P.R.S.M., Nov. '10, Baln. Sect., p. 7.

DIARRHŒA.—Large doses of Calomel. 20 grain doses repeated twice in the first 12 hours in the acute enteritis met with in the Tropics with temperatures ranging between 103° and 106° and highly offensive 'coffee-grounds' evacuations—most successful. In dysenteric diarrhœa whether bacillary or amœbic, with or without rise of temperature, 12 grains repeated twice in the 12 hours is perfectly safe, but whether constipation be present or absent 1 grain every three hours in 12 doses results in pronounced salivation in adults—the same would occur with this dosage in children, though they are known to be much more tolerant of Calomel.—H. D. McCulloch, B.M.J. ii./12,1428. Infants with diarrhœa may receive 2 grains. If vomiting, add equal quantity of Cerium Oxalate.—W. E. Fellowes, B.M.J. ii./21,176.

AMŒBIC DYSENTERY treated by Calomel and Magnesium Sulphate, followed by Salol, Bismuth Salicylate and Dover's Powder, 5 gr. of each in cachets.—N. Cantlie, Jl. Trop. Med., Feb. 1/23,43.

ASIATIC CHOLERA might well be treated with 5 grain hourly doses of Calomel—increasing to 10 grains if necessary.—W. E. Fellowes, B.M.J. ii./21, 176.

QUINSY.—Calomel placed on the tongue in $\frac{1}{6}$ grain doses and repeated every half hour for 12 to 18 hours stated to abort a quinsy. If used before suppuration occurs it may abort in 18 hours without purging. In two cases where suppuration had begun within the tonsil the method failed and strongly purged the patient.—B.M.J. ii./12,1249.

PEENASH, TREATMENT OF.—Peenash is due to the ravages of the larvæ of *Lucilia Macellaria.* One drachm of powdered Calomel blown into the nose or affected cavity kills the larvæ and causes them to drop out; washing out afterwards with a lotion will bring out the deeper seated ones. Infections with *Dermatobia noxialis* also treated in the same way.—B.M.J. i./11,362.

ENURESIS, give $\frac{1}{4}$ grain daily to regulate bowels.—B.M.J. i./06,905.

In RAISED ARTERIAL TENSION where indicative of danger, $\frac{1}{2}$ to 1 grain pill once or twice weekly followed by saline in the morning keeps down pressure.—Brunton.

Suspicious cracks or hangnails should have this ointment well rubbed in:—Calomel 33, Vaseline 10, Anhydrous Lanolin 57.—*Cf.*

Unguentum Prophylaxis.

Calomel Ointment 30% used as a prophylactic for syphilis in rabbits, proved efficacious up to 8 hours after inoculation with the disease. Death from mercurial poisoning produced by single application of a large amount of the ointment.—H. Nichols and J. Walker, per Jl. Trop. Med., June 15/23,223.

Calomel Tablets, $\frac{1}{10}$, $\frac{1}{6}$, $\frac{1}{4}$, $\frac{1}{2}$, 1, 2, 3, 4, and 5 grains.

Injectio Hydrargyri Subchloridi Hypodermica. LAMBKIN'S ORIGINAL FORMULA.

In syphilis, Calomel 10 grains, suspended in Sterile Olive Oil containing 2% Carbolic Acid, $\frac{1}{2}$ ounce. *Dose.*—10 minims injected once a week. Calomel is quickly absorbed but intensely painful, best used only as heroic measure.

Sterules of Calomel of this form are prepared containing the 10 minim dose=$\frac{1}{2}$ grain Calomel approx. Also containing $\frac{1}{6}$, $\frac{1}{4}$, $\frac{3}{4}$, and 1 grain of Calomel.

Morphine $\frac{1}{4}$ grain should be given afterwards to relieve pain.

Calomel injected with Oil in this way is partly converted into a soluble compound (probably Mercuric) and absorbed by the lymphatics and blood vessels and is partly taken up by Leucocytes and converted into a soluble compound within these.—Marshall.

Poisoning, fatal, from intramuscular Calomel injections.—B.M.J.E. i./22,49.

Ⓟ **Lotio Hydrargyri Nigra** (*B.P.* '14). BLACK WASH.

Mercurous Chloride, Glycerin, and Solution of Lime, about 1 in 150. Tragacanth Mucilage is now omitted. Contains Ⓟ **Mercurous Oxide** Hg_2O=417·2. (Ⓟ **'Precipitate, Red and all Oxides of Mercury'**).

Ⓟ **Unguentum Cinereum** containing Mercurous Oxide 1 in 10 or 20 of lard has been prescribed for syphilis—distinguish from Oleum Cinereum *q.v.*

Ⓟ **Gargarisma Hydrargyri Composita.**

Black Wash 1 ounce, Potassium Chlorate 10 grains, Water 1 ounce. For syphilitic throats.

Pilula Hydrargyri Subchloridi, Rhei, Cascara et Capsicin.

Calomel $\frac{1}{2}$ grain, Rhubarb Extract 2 grains, Cascara Extract 1 grain, Capsicin $\frac{1}{8}$ grain.

Relieves constipation, *e.g.*, that arising from large doses of Bismuth in treatment, see also Mistura Bismuthi, Phenolis et Morphinæ.

Pulvis Basilicus.

Dose.—For a child of 2 years, 4 grains (**0·25 Gm.**); of 6 years or upwards, 8 grains (**0·5 Gm.**).

Mercurous Chloride 3, Scammony 3, Acid Potassium Tartrate 3, Jalap 1, Ginger 1, Antimonial Powder 1.

Suppositoria Hydrargyri Subchloridi, L.H. Contain $\frac{1}{2}$ or 1 grain of Calomel in each.

Unguentum Hydrargyri Subchloridi.—*Syn.* CALOMEL OINTMENT (B.P. 1898) was Mercurous Chloride 1, Benzoated Lard 9. *B.P.* '14 is double strength. A skin application which may relieve itching.—See also **Unguentum Prophylaxis.**

Calomel Cream, L.L. Calomel 10 grains to Soft Paraffin 1 ounce. Distinguish from that of Lambkin—*q.v.*

[D] [P1] **Unguentum Calomel cum Morphina, L.I.P.**—Calomel 30 grains, Morphine Hydrochloride 3 grains, Bismuth Oxide 2 drachms, Glycerin of Boric Acid 2 drachms, Soft Yellow Paraffin 6 drachms.

Hydrargyri Succinas. $C_2H_4.(CO.O)_2Hg$=316·642.

Dose.—$\frac{1}{4}$ to $\frac{1}{3}$ grain (**0·016 to 0·02 Gm.**).

White Powder *soluble* in Normal Saline Solution 1 in 40, 1 in 7 of 5% Sodium Chloride Solution, 1 in 5 of 10% Sodium Chloride, 1 in 2 of 30% Sodium Chloride Solution by experiment. The first solution may be used for injection—practically insoluble in plain water.

Hydrargyri Succinimidum, Imido-succinate of Mercury.
$[C_2H_4(CO)_2N]_2.Hg$=396·69.

Dose.—By injection, $\frac{1}{4}$ to $\frac{1}{3}$ grain **(0·016 to 0·02 Gm.)**.

Prepared by adding freshly precipitated Mercuric Oxide 108 to a warm aqueous Solution of Succinimide 99 and evaporating to obtain crystals.

(**Succinimide** $C_2H_4\left\{\begin{matrix}CO\\CO\end{matrix}\right>NH$=99·048 is made by dry distillation—preferably under reduced pressure—of either acid or neutral Ammonium Succinate. Recrystallise distillate from water.)

Mercury Succinimide is a white powder, ***soluble*** in water about 1 in 28. Hypodermically in syphilis has been used in 2½% solution = slightly over 1% of mercury. Addition of cocaine nitrate diminishes pain.

[𝔇] [𝔓1] **Sterules, Hypodermic** of Mercury Succinimide, contain $\frac{1}{3}$ grain with Cocaine Nitrate $\frac{1}{6}$ grain.

Hydrargyri Sulphas. Mercuric Sulphate.

Syn. **Hydrargyri Persulphas.** $HgSO_4$ = 296·674.

Dose.—2 to 5 grains **(0·12 to 0·3 Gm.)**.

A white powder made by dissolving Mercury in boiling strong Sulphuric Acid. Water decomposes it with formation of yellow **Turpeth Mineral, Hydrargyri Subsulphas** Fr. Cx. or **Mercuric Oxysulphate,** $HgSO_42HgO$=729·894.

It is a prompt emetic in dose of 2 to 5 grains which was given to children in croup and diphtheria to expel false membrane. Does not produce purging. **Turpeth Mineral Ointment, Bazin's Ointment,** is 1 in 30 of Benzoated Lard. Used for ringworm.

Mercurous Sulphate, Hg_2SO_4 = 497·284.

A whitish crystalline powder slightly soluble in water and in dilute nitric acid. This salt, as also Mercuric Sulphate mixed with Potassium Bisulphate is used for construction of electrical cells.

Hydrargyri Tannas, Mercurous Tannate.

Dose.—1½ grain **(0·1 Gm.)** in a pill. Should it cause diarrhœa add $\frac{3}{4}$ grain of tannic acid to each, or $\frac{1}{12}$ grain of opium.

In dark green, odourless and tasteless powder or scales, containing upwards of 50% of mercury. It is not soluble or materially affected by diluted hydrochloric acid, but is decomposed by alkalis. Pills are made containing 1 or 2 grains.

Ⓟ **Unguentum Hydrargyri Oxidi Flavi.** *B.P.* '14.

Ⓟ **Yellow Mercuric Oxide** (HgO = 216·61. Made by precipitating Mercuric Chloride with Sodium Hydroxide Solution) in very fine powder 1, Soft Paraffin, yellow, 49. The powder and the resulting ointment should be neutral to moistened litmus paper.

Incompatibility.—Should not be used whilst patient is taking Iodide—violent irritation may be produced.—B.M.J.E. i./09,84. See also B.M.J. i./26,928.

Used for inflamed eyelids (but caution *antea*). Ⓟ**Pagenstecher's Ointment** 4%, *i.e.*, double this strength; ointments of 1·25, 2·5, 5, and 10% are also prepared. Syphilitic sores and eczema are well treated by the 1·25% ointment.

Martindale's Method of Manufacture.

We recommend the Yellow Mercuric Oxide *to be freshly precipitated and converted into ointment without preliminary drying.* This produces a perfectly smooth ointment free from grit. It can be effected by taking the equivalent of Mercuric Chloride to start with. 1·25 kilo of Corrosive Sublimate will produce 1 kilo of Yellow Mercuric Oxide on precipitation with Sodium Hydroxide (Solutions must be very dilute). This is carefully washed until the washings do not react with either Silver Nitrate or Phenolphthalein, and pressed in suitable linen free from "fluff," and finally in this moist condition is made up to 10 kilos with Paraffinum Molle (Yellow should be quite as suitable as white). The amount of moisture in the precipitate is easily ascertained and allowance made for, and *is reducible, by pressing to a very small amount.* Weaker strengths can then be prepared from this 10% bulk, as desired, by dilution with Paraffinum Molle. If kept exposed to light, Yellow Ointment may turn dark on the surface. If desired, the ointment may be kept under water, or be placed in 'Collapsubes' (strengths as above mentioned). We examined the contents of such Collapsubes two years after preparation and found them in good condition.—W. H. Martindale, Oph., Nov. 1906; L. ii./06,1459.

R.O.H. also adopts this method. ½ to 2% strength.

Ⓟ **Pasta Flava, Gt. Orm. H.**

Yellow Mercuric Oxide 15, Zinc Paste to 440 (Zinc Paste in this instance is Starch 108, Zinc Oxide 108, Soft Paraffin to 440).

Ⓟ **Unguentum Hydrargyri Oxidi Rubri.**

Syn. RED PRECIPITATE OINTMENT. (*B.P.* '14.)

Red Mercuric Oxide, in very fine powder 1, Paraffin Ointment 9. For use in chronic skin affections.

The Red Oxide is crystalline, and the Yellow (by precipitation) amorphous, but they are chemically identical.

Ⓟ **U.S. VIII.** had Red Oxide 1, Water 1, Hydrous Wool Fat 4, Petrolatum 4.

Lanolin used for this ointment, if applied over large surfaces may lead to severe Mercurial poisoning and is, therefore, to be avoided.

20 grains of Red Precipitate has been known to produce poisoning. There was vomiting after the dose, and finally death.—W.H.M. Dec. 1923.

Ⓟ **Pommade de Lyon.** Red Mercuric Oxide 1, Vaseline 15.

Ⓟ **Unguentum Rubrum cum Cantharide. V.H.C.** 1904. Red Mercuric Oxide 1, Vinegar of Cantharides 1, Soft Paraffin 6.

Hydrargyri Sulphidum Rubrum. *Syn.* VERMILION, CINNABAR. HgS = 232·66. Brilliant red powder insoluble in water and dilute acids prepared by subliming a mixture of Mercury and Sulphur. Both this and the black variety, **Hydrargyri Sulphuretum cum Sulphure** of same composition are not now employed therapeutically to any extent.

Ⓟ **Unguentum Rubrum** (Blackfriars).—N. H. W.

Vermilion 6 grains, Red Mercuric Oxide 6 grains, Creosote 2 minims, Lard to 1 ounce.

Hydrargyri Naphthol-acetas. Mercuric - β - Naphthol Acetate $Hg.C_{10}H_7O.CH_3COO = 402{\cdot}69$.

And the **Thymol Acetate** $(CH_3COO)_2\ Hg\ (CH_3COO.C_{10}H_{13}O)\ Hg = 727{\cdot}396$ are insoluble powders with *Dose.*—½ to 1 grain (**0·03 to 0·06 Gm.**). Schmidt gives method of manufacture.

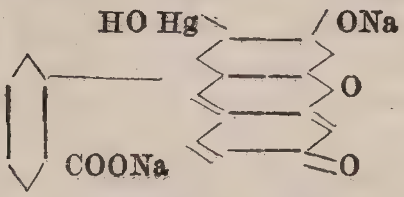
They are antisyphilitics. The latter has been used as an intra-muscular injection suspended 1 in 10 in liquid paraffin.

Ⓟ **Hydrargyri Sulphocyanidum** *Syn.* MERCURIC RHODANIDE $Hg.(CNS)_2 = 316{\cdot}754$.

White powder slightly soluble in water. Swells up on burning, producing 'PHARAOH'S SERPENTS.

Hexamine Compounds of Mercurial Salts, Acetate, Cyanide and Sulphate have been made. The inclusion of Hexamine reduces corrosive effect.—C. D., Mar. 31/23, p. 436.

Flumerin. *Syn.* DISODIUM SALT OF HYDROXYMERCURIC FLUORESCEIN.



or $C_{20}H_9O_5.Na_2,HgOH = 592{\cdot}684$

Dose.—The dosage given in the literature for adult males is from 0·2 Gm., increased, in 2% Solution, given at bi-weekly intervals, the average number of injections being 10. It has been stated, however, that in no case should the dose exceed 0·3 Gm., irrespective of the weight of patient. Caution—We have *very little personal experience* on the subject. *See also abstracts below.*

A reddish-brown powder, containing 33% Mercury in the non-ionised form.

It is antiseptic and readily soluble in hot or cold water. Freshly prepared solutions should be used.

A new mercurial for the intravenous treatment of syphilis. Pre-existing renal damage is a contraindication.

Gross secondary lesions show improvement within one week of administration of Flumerin alone. The action is not lasting, a positive W.R. is usually not altered to a negative. Tertiary cases presenting definite lesions show rapid clinical improvement with Flumerin alone. Toxic effects of the nature of acute mercurialism are occasionally seen; conversely, cases of great toleration are noted. It should be used with Salvarsan preparations (*or iodides—vide below*).—W. R. Snodgrass, L. i./24,117.

(There is an error in the graphic formula for the compound in this paper. The carboxyl group should be in the ortho position to the other side chain as we show it, not meta.—W.H.M.).

Flumerin should be given between courses of Arsenobenzol and not simultaneously. The suggestion to give with iodides is surely an error since there is danger of toxic mercuric iodide being formed. Moore and Wasserman suggest Arsenobenzol 8 doses at 5 to 7 day intervals, then 1 week later 12 Flumerin injections every other day; this is immediately followed by 6 injections of Arsenobenzol and 1 week later by 16 injections of Flumerin. Treatment is continued until the usual criteria of cure fulfilled.—Pres., Feb. '24,90. See also T. Stephenson, P.J. i./23,83.

All types of secondary lesions of syphilis healed and slower but steady resolution and healing of tertiary lesions. No uniformly striking effect on the Wassermann reaction. A 2% solution was used, the plan being to give 2 doses of 3 mgr. per kilo body-weight twice a week, then 2 doses of 4 mgr. per kilo, and a further 6 of 5 mgr. per kilo. Five patients developed toxic symptoms sufficiently severe to contraindicate further administration.—Per Jl. A.M.A., ii./25,222.

SYPHILIS OF THE EYE.—Intravenously in 2% solution, initial dose 3 mgr. per kilo, usually 0·2 increased to 0·4 Gm. Careful watching necessary. Gingivitis usually follows administration of more than 0·2 Gm., but not severe, disappearing in 48—72 hours.—J. F. Hogan & J. C. Robertson, Arch. Derm. and Syph., Nov. '25,700.—Per Pres., Sept. '26,331.

***Mercurome.** (T.M. 454754.) *Syn.* MERCUROCHROME-220, DISODIUM-DIBROMO-OXYMERCURY-FLUORESCEIN,
$C_{20}H_7O_5Br_2.HgOH.Na_2 = 750·5$.

Dose.—0.002 to 0.005 Gm. per kilo, *i.e.*, 0·13 to 0·32 Gm. (2 to 5 grains approx.) intravenously for a 10-stone (63½ kilo) man, preferably given in 0·5% or even *greater* dilution.

(The compound has also been given *per os*, see oral use.)

It is true that there are a large number of cases mentioned in the literature (*vide postea*) in which a 1% dilution has been used, but the writer has questioned the desirability of this strength (see L. ii/27, 1267). The recommendation here given is that of L. S. Dudgeon (L. i./26,172) who regards '10 Cc. of a 0·5% solution as the maximum that should be employed, and after two or three doses of this strength it is necessary to reduce to 1 in 500.'

In affections of the nature of plague, where drastic treatment is needed, the recommendation of A. Balfour (B.M.J. ii./25,1081), namely 20 Cc. of 1% solution, may be the only course open.

This authority writes us that probably no definite rules can be laid down, as the individual patient may react differently.

The following experiences in answer to the writer's letter to the *Lancet* are of importance:

Used after operation to prevent the onset of post-operative pneumonia. 20 Cc. of 1% solution given, with a further 10 Cc. two days later. Reaction mostly after the second injection—rigor and rise of temperature to about 102°F. In two cases reaction was severe. Agrees with the writer that the dose of L. S. Dudgeon (10 Cc. of 0·5% solution) is best.—G.P.B. Huddy, L. ii./27,1416.

5 mgr. per kilo in 1% solution given without trouble in several cases, but not repeated oftener than twice a week. A case of infective endocarditis lenta or subacuta, in a boy weighing 60 lbs., but losing weight, received 15 Cc. of 1% solution, *i.e.* rather more than 6 mgr. per kilo, but no benefit.—J. O'Carroll, L. ii./27,1416.

See also the interesting results of V. E. Lloyd at Guy's Hospital, in gonorrhoea, p. 483.

A case of septic cellulitis, involving the neck, arms and chest, with hæmorrhagic sputum from the throat (heart and lungs normal), treated with 320 Cc. of 1% Mercurochrome solution intravenously (*i.e.*, 3·2 Gm. of Mercurochrome). Death occurred on the following day.—E. Reavley (Canada), B.M.J., i./28,38. No reason is stated for giving this remarkable amount.

We learn from one of the London hospitals that the compound has been given intravenously in a considerable number of patients. Initially, a dose of 0·1 Gm. is given, increasing to 0·2 Gm. The injections have been given in some cases every day. There has not been any untoward result from the injection except some mild cases of stomatitis. It has been thought that in some cases the patient has benefited considerably by the injections but some further experience is needed before speaking definitely on this subject.

Against this must be set information (R. T. Slinger, Nov. 1927) that 0·1 Gm., both in 1% and 0·5% solution, in a case of subacute strepto-septicæmia, caused intense diarrhœa.

Pharmacology.—N.N.R. states that 10 mgr. per kilo invariably kills rabbits, yet the dose of 5 mgr. per kilo (0·3 Gm. for a 10-stone man) is mentioned in that work.

The writer had experiments specially conducted upon animals

(Dec., 1927), the doses in freshly distilled water being given to mice. It was found that a dose of 0.2 mgr. per Gm. caused immediate death in 4 out of 5 mice : a dose of 0·05 mgr. per Gm. caused death in 2 out of 5 at the end of 4 days. The maximum tolerated dose was 0·025 to 0·04 mgr. per Gm., and the report concluded 'it seems that a certain proportion of deaths would be likely to follow the injection of 8 to 15 Cc. of a 1% solution (*i.e.*, 0·08 to 0·15 Gm.) in man.'

The report prompted the writer's letter to the "Lancet," as there are numerous statements regarding this specific dose and strength in man. The evidence of the whole investigation is that animal experiments (especially with small animals) are not a complete guide for deductions.

Particular attention is drawn to the toxic effects detailed at the conclusion of the chapter. We feel that, as A. Balfour remarks, individual patients may react differently.

Chemical Characters.—Iridescent green scales readily soluble in water. It contains approx. 23% of non-ionised Mercury.

Incompatible with acids and with alkaloidal salts, *e.g.*, Atropine Sulphate, Cocaine Hydrochloride, Novocain, Butyn, Alypin, etc.—not to be used with the latter as a vesical wash.

Uses.—Mercurome has been found of value as an antiseptic in cystitis, pyelitis, in gonorrhœa and in infections of the urinary tract. It has been used *intravenously* in pneumonia, pernicious anæmia, articular rheumatism, and in septicemic conditions, as also in chronic malaria, typhoid, undulant fever, leprosy, and other tropical diseases.

As a general antiseptic in surgery, it has been extensively employed in place of Tincture of Iodine, as although it possesses the advantageous properties of Iodine it does not burn, irritate, or injure tissue as Iodine may.

Mercurome solution for local Surgical use. Mercurome 2, is dissolved in distilled water 35, add Alcohol 95% 55, and Acetone 10.

An efficient pre-operative skin disinfectant—better than Iodine, Potassium Mercuric Iodide, and Picric Acid, penetrating more deeply than the first two and as deeply as the last. It is painless and no cases of dermatitis have occurred. Bactericidal properties retained for 46 days.—W. W. Scott and J. H. Hill, Jl. Urol., Aug. '25, per Jl. A.M.A., ii./25,1162.

Stains on the Skin are easily removed with a little Chloride of Lime.

Mercurome Sterules, 0·2 Gm., for dissolving in 40 Cc. of water, for *intravenous* injection (making 0·5% solution or 20 Cc. of 1% Solution), and 0·3 Gm. for dissolving to make 30 Cc. of 1% solution for *vesical* injection, are prepared.

Injectio Mercurochrome (Intravenous) Gt. Orm. H. For *children* under 2 years 85 minims (5 Cc.) of $\frac{1}{4}$% solution = 0·012 Gm. For older children the same amount of a $\frac{1}{2}$% solution = 0·024 Gm. May be repeated on three successive days.

Mercurome Gauze (1 in 1000) is prepared.

Mercurome Ointment, 5% in Lanolin basis has been used in gonorrhœa. We have little information on its clinical user.

Mercurome Bougies, 1% in Theobroma Oil basis, 4 inches long.

References.

Anæmia, Pernicious.—Remissions in the course of the disease in 8 cases treated with Mercurochrome intravenously. The drug was given on an empty stomach in a dose of 3 to 5 mgr. per kilo, repeated at intervals of three days in a dose ¾ as large. Severe reactions follow injection, temperature rising to 103 or 104° F. Blood counts rose nearly to normal. Transfusion failed to do this. —Jl. A.M.A. ii./25,302.

Quicker and more lasting remissions than with any other treatment. Patients regain strength and enjoy life.—Iowa State Med. Soc. Jl., Feb. '26,58.

Intravenously unsuccessful in five cases. Produced very sore mouths.—G. Lovell Gulland, B.M.J. ii./27,671.

Antisepsis.—A 2·5% solution useful for surface lesions, for balano-posthitis, or for painting vaginal walls from which absorption is slight.—H. D. L. Spence, L. i./25,1382.

When used in wounds, sinuses, or serous cavities, dose should be limited to 5 mgr. per kilo. It is easily absorbed. Use not without risk. Should be reserved for desperate cases.—H. H. Davis, B.M.J.E., ii./26,71.

As a biliary antiseptic, it offers promise, since it is excreted in large part in the bile, and bile collected after its intravenous injection is definitely bactericidal.—S. M. Rosenthal and E. C. White, Jl. Pharm. & Therap., '24,287.

Hill and Scott found it a good biliary antiseptic for use intravenously in gall-bladder infection.—Arch. Int. Med., April, '25,503.

A failure as biliary antiseptic in experimental animals.—Jl. Infect. Dis., '26,249, per Pres., Jan., '27,8.

Infant suffering from staphylococcic suppuration of the umbilicus cured by local injections.—Abs. Pres., June '25,231.

For cleaning up infected wounds, abscess cavities and similar conditions a 2% solution locally is very useful and satisfactory.—Macphail, U.F.C. '25,121.

Better results in treatment of gunshot wounds by injection of 2% solution into the wound than by any method previously employed. —Nutter, U.F.C. '25,122.

No untoward results following 15 Cc. 1% solution intravenously. Used locally in 2% solution in maternity cases better than Tincture of Iodine. Excellent results in eye and ear diseases when used instead of Argyrol.—J. L. de la Guardia, U.F.C. '25,122.

Arthritis.—Both gonorrhœal and non-gonorrhœal forms successfully treated by intravenous injections: of 34 cases, 29 were definitely cured or improved.—H. H. Young, Jl. A.M.A., Oct. 23, '26,1369.

Gonorrhœal Arthritis.—Marked improvement, and condition cleared up almost completely after 6 doses over 14 days.—F. R. Lockhart, M.O., Dodoma.

One intravenous injection of 10 Cc. of a 1% solution of Mercurochrome said to have effected a cure of acute articular arthritis.—Per Jl. A.M.A., ii./25,1091. See also Macphail, U.F.C. '25,121.

Colitis, Ulcerative.—Lavage gave good results, using 6-8 ounces of 0·3% solution. In one instance irritability was caused, and a solution in Tragacanth Mucilage was more easily retained. —A. T. Todd. L. ii./25,1017.

Conjunctivitis.—2% drops are suggested.

Paranaud's Conjunctivitis yielded in a remarkable manner.—Coles Marshall.

Cystitis and Pyelitis.—As a vesical antiseptic, 1% is tolerated by the bladder for one to three hours and occasions no pain. It is very penetrating and has low toxicity. Rapid in action in refractory cases of cystitis and pyelitis, also used for gonorrhœa and chancroids, and as dressing for buboes.—Jl. A.M.A., '19,1483; B.M.J.E., i./20,20. See also Pres. June '23,249.

Remarkable results in chronic cystitis—75% of cures in 40 cases, only 3 not improved. Average number of days under treatment 18·5, and average number of treatments 7·6. In pyelitis, 10 out of 17 cases cured.—Young, White & Swartz, Jl. A.M.A., July '21,93.

Fifty cases treated; best results obtained in acute pyelitis, salpingitis, and bilateral nephrolithiasis with infection.—J. S. Tomkies, Texas State Jl. Med., May '25,24.

In old prostatic cases invaluable. After draining the bladder, 30 Cc. of 1% solution injected—there is no need to irrigate.—C. H. Badcock.

A case in which *B.coli* persisted treated with quite good results by douching the bladder after performing a prostatectomy.—R. T. Slinger, Nov. '26.

See also abstracts on Urinary Tract Infections.

Diphtheria Carriers. Painting the throat daily for a week with 5% solution, after spraying with an atomiser, cleared up bacilli, where 3 months painting with Löffler's solution failed.—P. Bousfield, L. i./28,79.

Dysentery.—Results of 5% solution, well diluted, by mouth and colonic irrigation, in amœbic dysentery (dose not stated).—Med. Jl. and Rec., Oct. 21, '25,479.

Eczema.—We have been informed of a case treated intravenously in this country which cleared up after four injections; well tolerated and without any signs of disagreeable after-effects.

Encephalitis.—A case of acute hæmorrhagic encephalitis of the cortex. Recovery followed its use.—per Jl. A.M.A., ii./25,1758.

In the second case of polio-encephalitis at Uppingham it was used by W. Dunn within a few hours and there was immediate improvement. It is of course a powerful agent and can, therefore, produce undesirable side reactions, *e.g.*, painful colitis.—B.M.J., ii./26,1004. See also re Polio-encephalitis *ibid* 1019.

Erysipelas.—Well treated with 5% solution applied to affected area with cotton swabs once daily.—Ann. Clin. Med., Oct. '25,333.

Of 24 cases, 20 were cured or greatly improved.—Young, Hill and Denny, Arch. Derm. and Syphil., Apl. '26,465.

GONORRHŒA.

As Vesical Injection.

30 Cc. of a 1% solution is generally employed. Stronger solutions have been used. An error occurred in the American literature which was copied in our last edition, viz., a 2·5% solution should have been mentioned instead of a 25% solution.

We issued a warning on the matter. Note, however, the following :—

A 25% solution of Mercurochrome *can* be used with perfect safety, and with benefit, for application to mucous membrane of the vagina in children of any age suffering from gonorrhœal vulvo-vaginitis. Applications can be made twice a week. They are made through an air-distention urethroscope. The 25% solution is also useful to apply to the cervical canal in women with gonorrhœal cervicitis. The warning (as to error) applies only as to the urethra.—B. B. Sharp, B.M.J., ii./25,928. See also H. D. L. Spence, L.i./25,1382.

Can be relied on to clear up a gleet in most chronic cases. Vast improvement in appearance of prostatic fluid, after treatment of chronic prostatitis —pus cells decreased enormously, and Streptococci and Staphylococci disappeared completely, but Diplococci less affected. Chief value in getting rid of secondary infections. Much more valuable than Calcium Chloride. Caused epididymitis to completely absorb.—J. Shircore.

In acute gonorrhœa valuable, but the staining is a drawback to its injection by the patient.—Young, White and Swartz, Jl. A.M.A., July 9, '21,93.

Use of a 5% solution each morning in early gonorrhœal infections produced apparent cure in some cases in 7 days, and in the remainder in varying periods up to 15 weeks. In the evening, a 25% solution of Argyrol substituted. Burning relieved by Oil of Santal, 10 minims three times a day.—E. Rupel, Jl. A.M.A., Feb. 24, '23,530.

Alternate use of Silver Salt solutions (Argyrol and Protargol) and the compound recommended in the treatment of both acute and chronic gonorrhœa. The new mercurial 'when properly used, is a valuable adjunct to the common-sense treatment of gonorrhœa and its complications.'—W. von Lackum & B. H. Hager, Jl. A.M.A., Dec. 8, '23,1940.

In women vaginal suppositories containing 2%, excellent. One placed in posterior fornix every night for 14 nights.—F. W. Johnson, Boston M. & S.J., Feb. 19, '25,353.

Intravenously.

Acute and chronic gonorrhœa—14 cases of adult otherwise healthy males treated in the V.D. Department at Guy's Hospital—3 of them acute with no complications, and the remainder in the chronic stages and suffering from chronic prostatis, seminal vesiculitis or both. First day, 10 Cc. of a 0·5% solution, followed at intervals of 2 to 3 days with 20 Cc. of 0·5%, two doses of 10 Cc. 1%, and then 3 doses of 20 Cc. 1%, with slight variations. No serious or marked reactions but slight reactions in five cases, diarrhœa, vomiting and malaise. In three cases the urine or urethral discharge was seen to be pink.—V. E. Lloyd, L. ii./27,1367.

Intravenous use in gonorrhœa advised. Dose, 2 to 5 mgr. per kilo Results rapid and satisfactory.—Jl. A.M.A., June 14, '24,1914; also Young and Hill, *ibid* Mar. 1, 1924.

Intravenously in gonorrhœa, 2 to 5 mgr. per kilo of a freshly prepared 1% solution used, the average total amount given being 9·6 mgr. per kilo. Abrupt termination almost incredible.—Pres., Nov.' 24,392.

Intravenously in 525 cases; high percentage cured or improved.—Redewill & Potter, Jl. A.M.A., June 20, '25,1891.

Ambulatory cases well treated with small doses over longer period.—J. E. Potter, U.S. Nav. Med. Bull., May '25,542.

Swift relief from pain of acutely swollen epididymis, and rapid apparent cure of severe gonococcus infection of urethra by intravenous use.—L. H. Williams, U.S. Nav. Med. Bull., June '25,677. Jl. A.M.A., ii./25,305.

Gonococci in culture acquire tolerance to Mercurochrome. This may account for unfavourable reports sometimes received.—Jl. A.M.A., Apl. 25, '25,1267. Per Pres., Jan. '26,22.

A 5% **Ointment** in Lanolin has been tried.

Leprosy.—Of value in checking rapid retrogression, and in treatment of ulcers, the result of disintegrating tubercles, and in the healing of neurotrophic ulcers. Weekly injection into a cubital vein of 2·5 mgr. per kilo, using a fresh 1% solution.—Jl. A.M.A., Nov. 21, '25,1608.

Of 44 cases, 28 were improved with remarkable disappearance of skin ulcers.–Young, Hill and Denny, Arch. Derm. and Syphil., Apl.'26,465.

Unless complicated by pulmonary tuberculosis, injections gave a definite improvement in the majority of cases. A routine dosage of 2·5 mgr. per kilo in 1% solution once weekly was used.—D. E. Renney and Co-workers, per L. ii./25,1031.

Good results in some advanced cases by alternating injections of Mercurochrome and "Moogrol." No effect in one case of late Nodular Leprosy.—W. K. Connell, M.O., Songes, per J. Shircore.

Malaria.—100% of cures obtained in chronic malaria by single intravenous injections of Mercurochrome (0·003 Gm. per kilo in 1% solution).—China Med. Jl., per Jl. A.M.A., ii./25,149. This seems a little too eulogistic.—W.H.M.

Malta Fever.—See Undulant Fever.

Mastitis.—Well treated with 2% solution.—Rucker, Jl. A.M.A., Mar. 15, '24.

Ophthalmia Neonatorum.—Well treated with 2% solution—non-irritating.—Clapp and Martin, Jl. A.M.A., May 1, '20,1924. Pres., Feb. 21, 69.

With 20 cases treated with Zinc Sulphate, the stay in hospital was 5 weeks; with 15 cases treated with Mercurochrome the stay was three and a third weeks. Treatment consisted in 10% Mercurochrome for 2 applications, and after that 5% every two hours.—Lancaster, Burnett and Gaus, Jl. A.M.A., Sept. 11, '20.

Obstetrics.—A 4% solution valuable and non-irritating for sterilizing birth canal before delivery. Particularly adapted for induction of labour and all operative deliveries.—H. W. Mayes, Am. Jl. Obstet. and Gyn., July '25,61. Jl. A.M.A. ii./25,772.

The 4% method of preparation of the genitalia for delivery a procedure safer than any yet advanced.—B. Lankford, Am. Jl. Obstet. and Gynec., Feb. '26,219.

Morbidity from child-birth reduced by over 50% by use of this solution.—H. W. Mayes, N.Y. State, Jl. Med., May 1, '26,384.

In gynæcology found useful.—B.M.J. ii./26,45.

Otorrhœa, Chronic.—Well treated with Mercurochrome 5% in 50% Alcohol, dropped into the canal and middle ear, and the canal plugged with cotton; 23 out of 45 ears became dry after an average of 6·5 applications.—Jl. A.M.A. ii./25,1251.

PLAGUE.—In view of the success attending the use of the compound in such diseases as enteric fever and puerperal fever, and the gratifying results following its intravenous administration in a case of Rocky Mountain Spotted Fever, its use is suggested in plague, which has many features in common with these diseases. It would probably be advisable to begin with 20 Cc. of a 1% solution intravenously, and to push the dose, especially in severe cases. Any risk of ptyalism can be combated with a mouth wash of Turpentine used alternatively with Hydrogen Peroxide (or by means of Sodium Thiosulphate intravenously).—Andrew Balfour, B.M.J. ii./24,1081. In a few cases the method distinctly beneficial.—ii./25,86.

PNEUMONIA.—Freeman and Hoppe recommend intravenous injection, in children, of 0·005 Gm. per kilo; marked improvement in a few hours, and the disease runs much shorter course.—Am. Jl. Dis. Child., Sept. 1924.

Brilliant results in post-influenzal pneumonia. 1 Cc. of 1% solution intravenously for every 10 lbs. body weight.—Followed by severe reaction. A mild form of stomatitis rarely seen.—W. E. Deeks, Int. Conf. on Health Prob. in Trop. Amer., '24,833.

Of 46 cases of pneumonia in children, 23 were given Mercurochrome intravenously, and 23 were used as controls. With the controls, the average duration of illness was 16·5 days while with those receiving Mercurochrome it was 6·5 days, the mortality respectively being 39% and 8·5%.—per Jl. A.M.A. ii./25,2057.

Following the routine use intravenously in lobar pneumonia the mortality rate in Puerto Castilla Hospital, Honduras, was lowered by 12½% in 1925. 15 Cc. of a 1% solution injected irrespective of weight or condition, though in robust patients 23 Cc. were injected for every 100 lbs. body weight. The most brilliant results were obtained with doses sufficient to cause marked symptoms, *e.g.*, chill, high fever, vomiting and diarrhœa, and even salivation. Violent reactions often incident on intravenous use.—H. M. Walker, U.F.C. '25,206-7. See also Drennan *ibid.* 121, Macphail *ibid.*

Patients underweight or undernourished should not be given more than 8 or 10 Cc. of a 1% solution intravenously.—W. Menk, U.F.C. '25,215-6.

Intravenously, tends to produce lung infarction. Small repeated doses give better results than a single large dose. Of 22 cases treated 10 died.—H. R. Eichelbaum, U.F.C. '25,204.

PUERPERAL SEPTICÆMIA.—*Intravenously,* in dose of 2 to 5 mgr. per kilo in 1% solution in water, successful in puerperal sepsis and acute gonorrhœa.—Young and Hill, J.A.M.A., Mar. 1/24. *See also Septicœmia.*

The intravenous use of Mercurochrome is not unattended by danger. Its use *per se* in puerperal septicæmia is most discouraging, though there have been some good results.—E. B. Piper, Am. Jl. Obstet. & Gynec., per Jl. A.M.A. ii./25,1330.

In a puerperal case, intravenously it was brilliantly successful, a single injection bringing the fever to an end.—G. Lovell Gulland, B.M.J. ii./27,671.

RELAPSING FEVER.—15 Cc. 1% solution intravenously. Effect on temperature and spirilla excellent; former dropped to normal and did not recur—no further attacks. Blood per rectum with diarrhœa 3 hours after injection, lasting a day and a half.—J. H. Parry.

RHEUMATISM, ARTICULAR.—One intravenous injection of 10 Cc. of a 1% solution said to have effected cure in a case of acute articular rheumatism in girl of 9.—Georgia Med. Assn. Jl., Aug. '25,320.

SCHISTOSOMIASIS.—The drug of choice in early stages with no serious complications and when hæmoglobin count is 70% or over.—G. T. Tootall, China Med. Jl., May '26,440.

SEPTICÆMIA.—Septicæmia, retroperitoneal infection, pyonephritis and *B. coli* urinary infection treated with remarkable success intravenously. Dose 5 mgr. per kilo.—Pres., June '24,242; Jl. A.M.A., '24, Mar. 1, 669—675.

23 Cc. of 1% solution intravenously given as last resort in case of puerperal septicæmia. Patient recovered.—W. M. Bowman, Virginia Med. Monthly, July '26,231.

Mercurochrome and Gentian Violet when injected in safe doses into the blood stream of rabbits with staphyloccic septicemia do not accomplish a therapia sterilisans magna, though either drug will exert a temporary bacteriostatic action in the blood stream. A large dose of either drug injected in the presence of an overwhelming infection may hasten death. These observations may be applied directly to the clinical use of these drugs intravenously. The general trend of opinion in those who have reported cases treated by either drug intravenously is that at times startling results may be obtained, but that failures are almost equally numerous. In the treatment of septicemic conditions Mercurochrome and Gentian Violet may be considered valuable adjuncts, but recovery from septicemia with other treatments may be just as startling (case cited).—W. D. Gatch, H. M. Trusler and J. E. Owen, Jl. A.M.A., ii./25,898.

Furuncle of the nose resulting in septicemia successfully treated by Mercurochrome, 26 Cc. of a 1% solution.—T. J. Harris, Jl. A.M.A., ii./25,1967.

In general septicemia following mastoiditis and its complications Mercurochrome intravenously (2 injections with 3 days' interval) of value.—C. J. Porter, Boston M. & S.J., June 25, '25,1239. Per Pres., Feb. '26,67.

Intravenously, justifiable in all cases with a positive blood stream infection, but all intravenous medication has great potential dangers.—B.M.J.E., ii./26,26. *See also* Pres., July, '27, 247 *et seq.*

Two cases of septicæmia treated with no ill-effects.—R. T. Slinger, Jan. 1, '28.

SKIN DISEASES.—A variety of infectious skin diseases, *e.g.*, erysipelas, furuncles, carbuncles, chancroidal ulcerations, cellulitis, abscesses, gas gangrene, pemphigus, psoriasis, eczema and leprosy well treated.—Young, Hill & Denny, Arch. Derm. & Syphil., Apl. '26,465.

SYPHILIS.—Two cases of condylomata of vulva completely cleared up after two intravenous injections of 10 Cc. 1·5%, and two cases of hard chancre after 3 injections, given at intervals of 2 to 3 days. Inferior to Salvarsan or Bismuth but valuable auxiliary.—J. Shircore.

TICK FEVER.—Results in 12 cases exceedingly good. All cured—10 after 1 injection, 1 after 2 injections, and 1 after 3. Temperature usually fell to normal or subnormal in 24 hours. In cases relapsing after Mercurochrome treatment spirochaetes present curiously attenuated appearance, and take stain in beaded manner, as though definitely affected by drug. Dose stronger than 10 Cc. 2% solution causes intense stomatitis. Reactions—particularly, greatly increased rapidity of pulse rate—more alarming than dangerous;

no fatalities. Sub-conjunctival hæmorrhage an untoward after-result. A child of 10 received 15 Cc. 1% solution without being seriously upset, but undoubtedly it is a most 'unpleasant' medicine. Neither Mercurochrome nor Salvarsan will prevent relapse in every case and in severe cases a single injection of each should be given at 2 day intervals.—J. Shircore.

Of 16 cases treated, 8 had relapses. 10 Cc. of a solution (2¼ grains in 12 Cc.) injected when temperature was going up or at its height. No immediate reactions or ill effects, but colic and blood-stained diarrhœa on night following injection.—T. H. Suffern.

There can be no doubt that the drug acts powerfully as an anti-spirochætal agent. Effect on *S. pallida* less marked than on *S. Duttoni* and *S. Pertenue.* In resistant cases with any of these parasites it might be used advantageously as an alternative or an auxiliary to the organic Arsenic preparations.—J. Shircore.

Tubercular Affections.—The local tissue toxicity of Mercurochrome in relatively low concentrations, and its poor tuberculocidal and bacteriostatic efficiency, would not seem to justify its use in the local treatment of tuberculous empyemas or pulmonary cavities. —Am. Rev. Tub., Oct. '25.

Mixed infection of the lung. 3 Cc. of 1% solution weekly transformed an apparently hopeless case (Staphylococcus poisoning with tuberculous lung) into progressive health.—J. Leggate.

Gratifying results in laryngeal tuberculosis by swabbing larynx thrice weekly with 20% solution.—per Pr., April, '28,268.

Typhoid.—Intravenously, reduced stay in hospital to one-third or half the average time.—Per Pres., Jan. '25,54.

Good results in 8 cases in children with 1% solution intravenously. Dose of 0.003 Gm. per kilo did not produce reaction.—China Med. Jl., Jan. '24,71. Also April, '24.

Undulant Fever.—Cure following 0·22 Gm. intravenously.—E. E. Gage and D. A. Gregory, Jl. A.M.A., Sept. 11, '24,849.

Mercurochrome should be tried. It would no doubt influence favourably a typical septicæmic disease like this. Failing this, Gentian Violet should be used. It could be used perhaps prophylactically as well, by treating infected goats.—A. Balfour, B.M.J. ii./25,86.

In one case treated with Mercurochrome only, 12 Cc. of 2·5% intravenously with 6-day interval between doses, there was rapid and lasting return of temperature to normal, though the treatment gave rise to severe reactions. In another case a total dose of 33 Cc. of 1% solution in 6 doses at 5 to 7-day intervals produced no effect in 6 weeks, and in a third a total dose of 17 Cc. of 1% solution in 4 doses at 5-day intervals produced no result in 9 weeks. Combined with vaccine treatment 2 cases out of 6 were followed by permanent recovery, but remainder were unbenefited. No two cases are likely to respond to the treatment in comparable fashion, and the best verdict as to value of Mercurochrome in undulant fever is "not proven" (this applies to both American and English products).—G. R. Ross and A. Paton Martin, Jl. Trop. Med., July 1/27,170.

Urethritis.—60 cases gonococcal urethritis well treated with 2·5% solution, 26 days being average length of time to effect cure. —T. M. Davis, Jl. A.M.A., May '22,20,1482. Satisfactory results in 187 cases.—Young, White & Swartz, Jl. A.M.A., July 9, '21,93.

A 1% solution used in urethritis caused intense pain in some patients.—H. D. L. Spence, L. i./25,1382.

Two cases of gonorrhœal urethritis treated with fair results.—R. T. Slinger, Nov. '27.

URINARY TRACT INFECTIONS.—Recommended in genito-urinary diseases. Used successfully in 77 cases.—J. E. Potter, U.S. Nav. Med. Bull., May '25,542.

H. H. Young is convinced the compound may be used intravenously in sterilising the urinary tract without fear of serious or continuous damage to the liver.—Jl. Urology, Jan. '26,11.

During the use of Mercurochrome, Sodium Acid Phosphate is given to keep the urine acid, since it has been shown experimentally that the Mercurial is more active as an antiseptic in slightly acid than in neutral or alkaline solutions. Mercurochrome rapidly and deeply penetrates tissues and does not precipitate Albumin.—A. T. Todd, L. ii./25,1017.

In alkaline urines Mercurochrome exerts an antiseptic action, but not nearly so powerful as Urotropine in acid urines.—Sir. J. Thomson-Walker, B.M.J. i./25,838.

Mercurochrome an effective antiseptic intravenously in acute and subacute infections of the urinary tract, but of less value in chronic cases.—Jl. Urol., Apl. '26,341, per Pres., Jan. '27,8.

See also Cystitis and Pyelitis.

YAWS.—Improvement very marked after one injection of 8 Cc. 2·5% solution intravenously. A second injection caused complete disappearance of crusts.—J. Shircore.

General References.

Of definite value in the treatment of 150 cases of acute bacterial infections. ***10 Cc. of 0·5% solution in saline (= 0·05 Gm.) is the maximum dose that should be given, and after two or three doses of this strength it is necessary to reduce to 1 in 500.*** Provided the correct dilution is employed, the preparation can be given in repeated doses without ill-effects. Shivering following injection prevented or modified by keeping patients warm during and after treatment and giving 10 grains of Aspirin with hot tea immediately after injection.—L. S. Dudgeon, L. i./26,172.

In the treatment of many conditions encountered in the Tropics. —U.F.C., Thirteenth Report, 1924.

A study of recorded cases treated intravenously. Of the 680 cases, covering an extremely wide range of local and general infections, 74·4% were cured or improved, in 2·6% action was doubtful 3·4% showed temporary improvement, and in 19·6% the treatment failed. The febrile reaction following injection seems very important in the cure, though with small doses (2 to 3 mgr. per kilo) splendid results are obtained with no reactions. With full dosage (5 mgr. per kilo) great care is needed and intervals should be 3 days or more.—H. H. Young, Jl. A.M.A., Oct. 23, '26,1366-1372.

Goats might with advantage be treated with either Mercurochrome or Gentian Violet to rid of infection with *Micrococcus* (*Brucella*) *melitensis.*—A. Balfour, B.M.J. ii./25,86.

Useless in malaria, but good results in chronic gonorrhœa, chronic prostatitis, chronic salpingitis, epididymitis, gonorrhœal arthritis, septic arthritis, septicæmia and pneumonia, but at necropsy cases given Mercurochrome intravenously (mostly pneumonia) almost constantly showed hæmorrhagic infarcts.—Brosius, U.F.C. '25,121.

Given intravenously, its maximum effect in the blood occurs in the first hour. A case of acute mucopurulent pharyngitis with a positive blood culture of hæmolytic streptococci cleared up after three doses of 15 Cc. of a 1% solution, equivalent to 2·8 mgr. per kilo, and one 10 Cc. dose. The interval between the first two doses was 24 hours and between the 3rd and 4th doses 4 days. The only reaction was slight diarrhœa after the first dose. Two cases in which pyrexia following laparotomies and removal of appendices occurred was reduced by injections of 15 Cc. of a 1% solution, equivalent in each instance to a dose of 3 mgr. per kilo. Moderate diarrhœa with a trace of blood and two vomits occurred in one of the cases. Pyæmia after appendicectomy was apparently cured by 3 injections each of 15 Cc. of 1% solution.—N. M. Goodman, M. B. Thesis 1925.

Oral Administration.—Has been administered in enteric-coated capsules. Drug of choice in *Giardia* infections. Dose from 1½ to 3 grains (0·1 to 0·2 Gm.) from one to four times daily acccording to toleration, for 14 to 22 days. Treatment individualised: stools must be kept dark mahogany colour. No harmful or distressing effects.—G. A. Gray, South Med. Jl., B'ham., U.S., Nov. '26,780. ***As yet we have no personal knowledge of internal use.***

Toxic Effects.

Salivation has occurred, but in most cases only after prolonged use of the drug in fairly large doses, *e.g.*, in one case, 15 Cc. of a 1% solution every day for 19 days (total 2·85 Gm.) into a sinus. When used intravenously, small doses should be given at first in all but the most desperate cases.—Pres., Oct. '24,365. See also W.H.M., L. i./25,1330, and H.D.I. Spence, *ibid* 1382,

Stomatitis, diarrhœa, etc., following Mercurochrome intravenously.—Jl. A.M.A., Nov. 22, '24,1681. Per Pres., Jan. '26,7.

In erysipelas.—Stomatitis occurred in 3 out of 17 cases and diarrhœa in all cases but two; two patients died, the autopsies showing inflammatory changes in the kidneys. May be used with advantage in able-bodied cases (selected) with no kidney involvement, in recurring cases, and severe cases with blebs and vesicles. Kidney function test should precede administration.—B.M.J.E., i./25,17.

Death following intravenous injection of (1% solution) in five cases of sepsis. Post-mortem examinations showed evidence of renal and colon involvement, and it is considered the Mercurochrome induced the intense nephritic and intestinal lesions and thus contributed to death. Chemical analysis of viscera showed Mercury in even larger amounts than found in Mercuric Chloride poisonings. From the meagre cautioning literature and the unfavourable cases that are everywhere discussed, it is evident that the dangers of the drug have not been brought sufficiently to the fore. Locally, Mercurochrome is probably a very good antiseptic; systemically, it may be of value in selected cases properly administered or controlled, though its indiscriminate use in such conditions as acute rheumatic fever and malaria should not be countenanced. The ***margin between a therapeutic and a toxic dose must be variable and small indeed.***—A. V. St. George, Jl. A.M.A., ii./25,2007.

Mercurochrome injected subcutaneously, intratracheally and into the pleural cavity of the dog produces profound pathologic tissue changes and it would seem inadvisable to treat pulmonary conditions, especially tuberculous cavities, by means of such injections. The treatment of empyemas by means of Mercurcohrome in concentrations exceeding 0·1% is also advised against. Exhaustive tests of all new drugs should be made on animals before use in man.—H. J. Corner, Jl. A.M.A., ii./25,256—262. In the discussion following the reading of this paper, E. C. White, as one of those responsible for the introduction of the drug, pointed out that it was ***originally***

introduced for use in the genito-urinary tract, that he had never advocated its use in the respiratory tract of accessory organs, and that those who used the drug for this purpose must assume responsibility for possible untoward results.—*Ibid.*

Mercurochrome causes little or no gastro-intestinal disturbance until it has been taken in large doses for a week or more. No bad results following administration of 0·9 to 1·2 Gm. daily for 10 days. Use of Mercurochrome by the laity no more dangerous than use of Tincture of Iodine.—Jl. A.M.A., ii./25,1242.

Idiosyncrasy to Mercurochrome.

Patients showing a hypersensitiveness to intravenous Mercurochrome secrete a proportionally greater amount in the saliva and gastro-intestinal tract than by the kidneys, and give a negative result with the following test in the seminal fluid : A little **Diphenylcarbazid** and 0·5 Cc. Carbon Tetrachloride is shaken with the seminal fluid, a purple colour being produced with minute amounts of Mercury. By this test and a Mercurochrome Kidney Function Test, patients not suited for continuous use can be detected after the first injection.—Redewill & Potter, Jl. A.M.A., June 20/25, pp. 1891—1897, quoted by A. Balfour, B.M.J., ii./25,86.

In malaria.—Intravenously 1% solution, 3 mgr. per kilo, of no value. Stomatitis and ptyalism marked features—irritates kidney to extent of producing mild nephritis.—J. W. Dundas and D.M. Telang, I.M.G., Mar. '26,116.

A certain percentage of all patients show a ***hypersensitiveness*** to Mercurochrome intravenously, and some develop very severe reactions, but in the large majority of cases the dose recommended by Young rarely causes serious discomfort.—Macphail, U.F.C., '25,120.

Intravenous injections in doses of 0·001 to 0·005 Gm. per kilo did not produce anaphylactoid reactions which could be shown in the lungs of guinea-pigs.—J. E. Sanner and G. H. Hill, Jl. Ph. & Exp. Ther., Nov. '26,99.

Bactericidal Action.

After Mercurochrome, rabbit blood was found to be bacteriostatic and occasionally bactericidal for colon bacillus for 5 hours; the urine for about the same time.—H. H. Young and Co-workers, Jl. Pharm. Experim. Therap., Mar. 24/139.

In vitro, 0·1% kills *B. Coli* and *Staphylococcus aureus* in urine in one minute.—Jl. Am. Med. Assn., 1919, 1483, abst. P.J. i./20,6. B.M.J.E. i./20,20.

The activity of Mercurochrome is reduced if not in immediate contact with the infecting organisms. It is feebly effective in streptococcal infections, both subcutaneously and intraperitoneally.—E. L. Walker, Jl. Pharm. and Exp. Therap., XXVI., No. 6, p. 461.

Added to human defibrinated blood outside the body it in no way enhances the bactercidal power of the blood : injected intravenously it does not increase the bactericidal action tested shortly afterwards, and no special antiseptic properties are conferred on the bile by such injection.—L. Colebrook and R. Hare, Brit. Jl. Exper. Path., April, 1927, per L. i./27,1195.

A method of testing chemical compounds for their therapeutic efficiency in experimental staphylococcic septicæmia in rabbits, Mercurochrome and similar dyestuffs being used in the investigation.—G. W. Raiziss and Co-workers, Jl. Ph. & Exp. Ther., Jan. '26,447.

The action of Mercurochrome, Gentian Violet and Acriflavine in experimental bacterial infections.—E. L. Walker and M. A. Sweeney, Jl. Ph. & Exp. Ther., Jan. '26, p. 461.

Organic Mercury Compounds (Various).

Rabbits experimentally infected with *Staphylococcus aureus* are beneficially influenced by the intravenous injection of the following compounds 48 or 72 hours after infection : Metaphen, Mercurochrome 565, (Mercury derivative of Rose-Benzol 3B) and Benzurin (Mercury derivative of Benzopurpurin 4B). The results with the last compound were particularly promising.—Jl. Pharm. Exp. Ther., '26,26,447.

Chloro-Mercury-Fluorescein. A compound from which Phenol-sulphone-phthalein is eliminated in the urine ,has been given *per os* as urinary disinfectant.—L. i./22,147.

Experimental nephropathy produced by **tetrahydroxymercuri-phenolsulphone-phthalein.**—Burns and co-workers, J.C.S.A. i./20,610.

P1 ***Novasurol** (T.M.421577). *Syn.* MERBAPHEN.

A double salt containing Sodium Oxymercuri-orthochlor-phenoxylacetate, $HOHg.C_6H_3Cl.O.CH_2COONa$, and Veronal. Mercury content about 34%. Readily soluble in water.

Dose.—An initial dose of 0.5 Cc. of a 10% solution has been advised. (See abstracts.)

Uses.—It produces profuse and rapid diuresis when injected intramuscularly or intravenously.

Used in dropsies due to cardiac and cardiorenal disease. It has been recommended in passive congestion of the kidneys, nephroses, arterio-sclerotic and idiopathic contracted kidney, but it is contra-indicated in acute renal disease. Some good results have been reported in the removal of effusions in pleurisy, cirrhosis of the liver, and ascites of tuberculous and carcinomatous character, but in these cases the drug cannot be regarded as reliable.

A diuretic of value in cardiac failure. When employed with Digitalis each enhances the other's action. The dose usually employed was 1 Cc. of 10% solution injected into some œdema-free area, either the buttock or back. The drug must be used by intramuscular or intravenous injection (0·1 to 0·2 Gm.) since it is intensely irritant subcutaneously.—A. R. Gilchrist, L. ii./25,1019.

Gives better results in treatment of ascites in hepatic disease than any other treatment. Best results obtained by combined use of Novasurol intramuscularly or intravenously in doses up to 2 Cc., at intervals of 3 days to a week (initial dose to determine tolerance 0·5 to 0·75 Cc. intramuscularly), and daily administration of Ammonium Chloride, up to 10 Gm. daily, in capsules containing 0·75 or 1·5 Gm., with restriction of water intake, and low-fluid, low-salt diet.—L. G. Rowntree and Co-workers, Jl A.M.A., ii./25,1187—93.

The combined effects of controlled diet, Ammonium Chloride and Novasurol found beneficial in treatment of nephritis with œdema, when singly each was ineffective.—H. M. Keith and Co-workers, Jl. A.M.A., ii./25,806.

Hydrophilia of the tissues the special indication for Novasurol.—Jl. A.M.A., ii./25,1098.

While confirming the value of Novasurol as a diuretic, it is pointed out that the ***initial dose of 1 to 2 Cc., suggested by the manufacturers, is extremely inadvisable, causing diarrhœa so extreme as to produce serious collapse. Initial dose of 0·5 Cc. should never be exceeded, and even then profuse watery diarrhœa follows administration.***—T. G. Moorhead, B.M.J., i./26,261; see also R. Howarth, *ibid* 187.

Intramuscular injection of 2 to 5 Cc. of a 5% Peptone solution a good antidote for the diarrhœa following the injection of Novasurol.—H. Pollitzer, Jl. A.M.A., ii./25,2001.

Novasurol and other diuretics in cardiac œdema.—C. G. Lambie, B.M.J., i./26,80.

For further Organic Mercurial Compounds see Vol. II.

HYDRASTIS RHIZOMA.

Syn. GOLDEN SEAL.

NOTE.—*The preparations of this drug should be treated as Poisons in view of their uses, though we know of no actual fatalities from them.*

Dose.—10 to 30 grains (**0·6 to 2 Gm.**).

The dried rhizome and rootlets of *Hydrastis canadensis* (*Ranunculaceæ*). *B.P.* '14, not standardised. U.S. is standardised to 2.5% alkaloids (Ether soluble). Hydrastis Leaves and Tops also contain Hydrastine.

For assay and data on Chemistry of the Alkaloids, cf. Vol. II.

Uses.—*Internally* it possesses tonic stomachic properties, being useful in general debility,—action not unlike that of quinine. Is used in intermittent fevers. The drug and the alkaloids Hydrastine and Hydrastinine cause uterine contraction and are efficient remedies in checking menorrhagia and in relieving dysmenorrhœa. Contains in addition to Hydrastine (1·5 to 3%) a quantity of Berberine, *q.v.* In gastric catarrh from chronic alcoholism is about the best substitute for the stimulant when this is abandoned. It is useful in fibroid tumours; does not cause painful contractions. Local application is often successful in chronic pharyngitis. In goitre it is successful.

Externally it is employed in chronic inflammation of the mucous membrane, also for cracks and fissures of the nipple. It stimulates unhealthy ulcers, and as a lotion (1 in 20 of liquid extract) checks profuse sweating, employed in acne and seborrhœa and stops nose bleeding. In gonorrhœa, more particularly the late stages, both locally and internally is of value; as an injection 1% solution of the liquid extract (or combined with 1% of Protargol and 5% Glycerin) is recommended.—H.

Ⓟ**Infusion** of 1 drachm in 8 ounces boiling water useful in vaginal gonorrhœa and leucorrhœa.—H.

Flavoring of Liquid Hydrastis preparations.—Syl Lavandulæ. Glyl or Syl Pini (in bold dose); Elixir Aurantii, Syrupus Limonis.

Ⓟ**Extractum Hydrastis Liquidum.** (*B.P.* '14.)

Dose.—5 to 15 minims (**0·3 to 1 Cc.**) Is made with 60% alcohol, standardised to 2% Hydrastine. Fr. Cx. extracts with 70% alcohol.

In pruritus ani for the varicosity of piles inject daily one or two ounces of the following, mixed:—Liquid Extracts of Hydrastis 2, Hamamelis 16, Ergot 2, Compound Tincture of Benzoin 2.

Ⓟ**Capsules** are prepared each equivalent to 30 minims of the liquid extract.

P1 Mistura Hydrastis et Ergotæ.

Liquid Extracts of Hydrastis and Ergot of each 30 minims, Chloroform Water to 1 ounce for a dose.

This is one of the most powerful remedies for menorrhagia, and so also is a mixture of Hydrastis and Hamamelis.—W. W. W.

Ⓟ**Mistura Hydrastis Composita, W.**—Liquid Extract of Hydrastis and Liquid Extract of Hamamelis each 15 minims, Cinnamon Water to 1 ounce.

Ⓟ**Extractum Hydrastis.** *Syn.* Hydrastinum.—Prepared by alcoholic extraction. *Dose.*—2 to 5 grains (**0·12 to 0·3 Gm.**)

Fr. Cx. prepares with 60% alcohol and evaporates to soft extract.

Uses.—Aperient, cholagogue, stomachic, and tonic. 3 to 6 grains in a pill, followed by Effervescing Sodium Sulphate, is a useful biliary stimulant and has been used as a dressing to ulcers.

P1 Hydrastina, Hydrastine. Fr. Cx.

$C_{21}H_{21}NO_6$=383·176.

Dose.—½ to 1 grain (**0·03 to 0·06 Gm.**). Fr. Cx. has max. single dose 1½ grains, Max. during 24 hours 4½ grains approx.

Pills containing ¾ and 1 grain are made.

An alkaloid in white prismatic crystals, slightly soluble in water, but soluble in alcohol 90% 1 in 150, chloroform 1 in 2, and ether about 1 in 90; taste very bitter.

$\boxed{\text{P1}}$**Hydrastinæ Hydrochloridum.** **P. Belg.** $C_{21}H_{21}NO_6HCl$= 419·641. + Aq. *Dose.*—½ to 1 grain (**0·03 to 0·06 Gm.**).

A crystalline soluble salt; said to act as an expectorant.

M.pt. is stated to be 116° C.; the air-dried salt melts at a decidedly lower temperature, and when dried near 100° C. the M.pt. is 168° C.—D. B. Dott, P.J. ii./22,607; i./23,10.

Found to produce uterine action and induce abortion, without danger to the patient, injected hypodermically.

$\boxed{\text{P1}}$**Tablets, Hydrastine Compound.**—Hydrastine Hydrochloride ¼ grain, Ergotin ½ grain, Cannabin Tannate ½ grain. Efficient in checking menorrhagia and post-partum hæmorrhage.

$\boxed{\text{P1}}$ **Hydrastininæ Hydrochloridum.** Fr. Cx., P. Ital., P.G. VI. $C_{11}H_{11}NO_2.HCl$ = 225·561.

Dose.—½ grain (**0·03 Gm.**) *per os* or hypodermically in 10% solution. Fr. Cx. has max. single dose ¾ grain; max. during 24 hours 2¼ grains approx.

A salt of $\boxed{\text{P1}}$**Hydrastinine,** $C_{11}H_{11}NO_2$ = 189·096 + Aq. (Fr. Cx.). An oxidation product of Hydrastine, is allied to Cotarnine. It is probably the active constituent of the drug.

In pale citron yellow crystals, ***soluble*** 1 in 1 of Water (with blue fluorescence when considerably diluted). M.pt. 212° C.—confirmed by D. B. Dott, P.J. ii./22,607; i./23,10. M.pt. of the base is 116 to 117°.—*ibid.* Has been used for internal hæmorrhage hypodermically. Useful in menorrhagia and dysmenorrhœa.

Ⓟ **Sterules, Hypodermic of Hydrastinine Hydrochloride** contain ¼ and ½ grain (**0·016 and 0·03 Gm.**).

Ⓟ**Tinctura Hydrastis** (*B.P.* '14).

Dose.—30 to 60 minims (**2 to 4 Cc.**).

Prepared 10% of the Liquid Extract which is standardised.

Fr. Cx.—1 in 5 of the root by weight. Not standardised.

Flavoring.—As Extractum Hydrastis Liquidum *q.v.*

Ⓟ**Liquor Sedans.** *Dose.*—½ to 1 drachm (**2 to 4 Cc.**).

A specialty said to contain in 1 ounce Hydrastine (representing Fluid Extract of Hydrastis 30 minims); Black Haw (*Viburnum Prunifolium*) 60 grains; Jamaica Dogwood 30 grains; with aromatics. To restrain nervous irritability and as ovarian and uterine anodyne.

HYDROGENII PEROXIDI LIQUOR.

H_2O_2 = 34·016.

Syn. **Soluté officinale d' Eau Oxygénée.** Fr. Cx. 12 vol. 'Hydroxyl.'

Dose.—½ to 2 drachms (**2 to 8 Cc.**).

May be prepared by the action of diluted mineral acid (especially sulphuric acid) on barium peroxide in presence of water.

Electrolytic method of making by treatment of Sulphuric Acid in the presence of Hydrochloric Acid or Hydrofluoric Acid. $H_2S_2O_8$ (Persulphuric Acid is first made).—P.J. i./16,3.

Method of making, using Phosphoric Acid and Barium Peroxide, also by passing steam through a mixture of Potassium Persulphate and Sulphuric Acid.—German Patents.—P.J. i./15,656.

The *B.P.* '14 'ten volume' Liquor yields 'ten volumes' of available oxygen when decomposed—*i.e.*, 1 Cc. will evolve 10 Cc. of oxygen, or 1·45% of its weight=3·04% by weight H_2O_2. It has the second atom of oxygen in a very loose state of combination. **Twenty volume strength is also available in commerce.**

Hydrogen Peroxide is produced naturally in many ways, as by the oxidation of oil of turpentine, oil of eucalyptus, &c. It is contained in 'Sanitas,' *q.v.* The solution is used for bleaching ladies' hair. It has a harsh bitter taste.

Incompatibility.—It readily decomposes, especially in contact with metallic oxide, such as that of Silver or Manganese, these if moist and freshly precipitated cause oxygen to be briskly evolved from it. Ether restrains this decomposition, and is used for making Ozonic Ether.

Further incompatibilities are Alkalis, Ammonia, Arsenous Salts, Carbolic Acid, Glycerin, Hypophosphites, Iodides, Mercurous Salts, Potassium Bromide, Chlorinated Soda and Chlorine Water.

Borax is frequently prescribed with Hydrogen Peroxide to neutralise acidity, but the product is very unstable—a sample titrating 11 vols. entirely decomposed within 21 days.—P.J., i./25,549.

For Assay and Preservation, see Vol. II.

Uses.—Internally is non-poisonous and has been given for pertussis, flatulent dyspepsia and other affections, **but now it is mostly employed locally. It is useful for assisting in removing surgical dressings which adhere obstinately. It is valuable, used *undiluted*,** as a pigment or spray for diphtheria, tonsillitis, laryngeal tuberculosis, stomatitis, putrid bronchitis and non-syphilitic ozæna. **For tuberculous and syphilitic ulcers, gangrene, malignant pustule and for purulent discharges it is antiseptic. It is astringent, *e.g.*, in epistaxis, and styptic in removing polypi. Does not precipitate albumin. May be used locally for inoperable uterine cancer, chilblains, lupus, favus and other skin affections, also in gonorrhœa (up to 10 volume strength) occasionally. Wasp and hornet stings are at once relieved.**

OTORRHŒA and OTITIS may be treated with the 10 volume solution preferably diluted with equal volume of water, but may be used stronger, *e.g.*, of the official strength. After syringing out with weak boric acid lotion, allow to remain in 15 minutes, syringe out again, and dry carefully.

Dangers of Hydrogen Peroxide in treatment of otorrhœa. In contact with pus it yields a large quantity of Oxygen which may cause serious symptoms and even death.—J. S. Oiestad, Tidskr. f.d. Norsk. Lægef. Per Pres., Feb. '26,69.

Gangrene of scalp following use of a 30% solution of Hydrogen Peroxide for bleaching the hair.—B.M.J.E., i./26,64.

DIPHTHERITIC CONJUNCTIVITIS is treated with a 10% dilution of the official Liquor. EMPYEMAL CAVITIES have been washed out with diluted solutions, but danger has arisen from embolism by the oxygen evolved. Also employed well diluted in *erysipelas*, and as an enema in *dysentery*.

HAY FEVER is treated by spray of Hydrogen Peroxide into the nose, and on the conjunctiva it proved efficacious.

PURULENT CONJUNCTIVITIS (gonorrhœal and membranous) is treated with 10 volume Hydrogen Peroxide. In the former case used as warm douche (104° F.) destroys gonococci. Will reduce corneal opacity.

In FISTULA in cleaning up unhealthy germinating areas and blind pockets, Hydrogen Peroxide is invaluable—on no account should Silver Nitrate be used for this.

Good deodorant to clear a cavity or surface wound but not satisfactory as a wet dressing on gauze. Its mechanical effect is practically its only recommendation as a lotion for dressing—Casualty Clearing Station experiences. —A. Don, B.M.J. i./16,648.

Neutralising Hydrogen Peroxide Solution with Calcium Carbonate and filtering is said to obviate the pain caused by syringing wounds in the ear with the ordinary acid preparation. This, of course, must be done only at the time of use as the solution would thus rapidly lose its strength.—H. Finnemore, P.J. i./14,421.

Gargarisma Hydrogenii Peroxidi

Hydrogen Peroxide Solution 1 drachm, Sodium Chloride 5 grains, Glycerin 30 minims, Water to 1 ounce. (*Caution.—In a strong bottle.*)

Collutorium Hydrogenii Peroxidi.

Hydrogen Peroxide Mouth Wash.—*Martindale* ('10 volume').

Hydrogen Peroxide Solution (20 volume) 500, Oil of Peppermint 1, Saccharin Elixir 30, Thymol Water 470.

Astringent Hydrogen Peroxide Mouth Wash.—*Martindale.*

The above with 5% of Solution of Aluminium Acetate added makes a useful astringent antiseptic mouth-wash.

As a mouth-wash dilute either of the above with 7 parts of water.

We conducted a number of experiments using Krameria and other ingredients, but the above are the most satisfactory.

For painful ulcers of the mouth in syphilis either of these preparations is suitable—if necessary use stronger, *e.g.*, 1 to 4.

Lotio Salox V.H.C.

Hydrogen Peroxide Solution (20 vol.) 907, Sodium Chloride 85, Boric Acid 12. For use add one part to 4 of water.

Unguentum Hydrogenii Peroxidi.

Hydrogen Peroxide Solution 10 (or less as ordered), Anhydrous Wool Fat to 100. Useful in eczema and other parasitic skin affections. Should be freshly made.

Dental Use.—The 20-volume strength can be used for acute or chronic periodontitis and gouty periodontitis by syringing out pockets around affected teeth after removing any calculous or other matter. May also be used for septic root canals.

Ozonic Ether.

Dose.—½ to 1 drachm (2 to 4 Cc.).

A solution of about 1·2% by weight of H_2O_2 in ether (*i.e.*, 4 volumes approximately). It is miscible with water in all proportions up to three times its volume, possesses properties similar to the above, and is more stable. In conjunction with Tincture of Guaiacum, it is employed as a test for blood, *v. Vol. II.* Has been given internally for diabetes and whooping-cough, and has been used locally for scarlet fever. It bleaches teeth which have become discoloured from death of the pulp, etc.

Hydrogenii Peroxidum Boratum.—BORATED HYDROGEN PEROXIDE.

Neutralise carefully (using Phenolphthalein as indicator) any desired quantity of Hydrogen Peroxide (previously examined to ensure correct) with caustic soda. Then add 3% boric acid. The preparation is permanent, within reasonable limits.

Liberates oxygen on coming in contact with blood or other organic matter. A useful mouthwash.

Loss of sense of smell returned (to our knowledge), after the use of this preparation as a nasal lotion.

✱Hyperol (T.M. 343485 Class 3) **'Solid Hydrogen Peroxide.'**
A concentrated Hydrogen Peroxide is obtained by forming the compound with Urea, $CO(NH_2)_2.H_2O_2$ rendered stable with a trace of Citric Acid. One Gm. dissolved in 10 Cc. of water gives a solution of 10 vols. strength. The solid is stable in temperate and sub-tropical climates, but decomposes when heated to 60° C.—Analyst, '26,50.

Magnesii Peroxidum.
Dose.—15 to 60 grains (1 to 4 Gm.).
A white tasteless powder insoluble in water, containing about 20% of Magnesium Peroxide, $MgO_2=56{\cdot}32$, with Magnesium Oxide, and is for use where increased oxidation is desired: given for weak digestion, anæmia, and in diarrhœa of phthisis, vomiting, anorexia, flatulence and pyrosis.
5 to 10% added to precipitated or prepared chalk powder makes a good dentifrice.

Tablets and 'Stearettes' of Magnesium Peroxide, 3 grains each are prepared.

Dentifricium Oxidans. *Syn.* OXIDISING DENTIFRICE, R.D.H.
Hard Soap and Orris Root of each 30 grains, Clove Oil 2 minims, Menthol 1 grain, Magnesium Peroxide 1 drachm, Precipitated Chalk 1 ounce.

Zinci Peroxidum. FR. SUPP. II. EKTOGAN, DERMOGEN. $ZnO_2=97{\cdot}38$.
A white powder insoluble in water. Used locally in skin affections. Promotes healing of chronic ulcers. For burns and wounds. ***Incompatible*** with Corrosive Sublimate. 10% **Unguentum** or dusting powder is used.

Sodii Peroxidum, Sodium Dioxide, F.E. $Na_2O_2=77{\cdot}994$.
A yellowish white amorphous deliquescent powder, dissolves in water with production of heat and evolution of oxygen. 50% solution has been used in dentistry to whiten stained teeth. Technically used as bleach for sponges, wool, bones, oils, etc.
Unguentum Sodii Peroxidi. 20% in soft white paraffin may be tried with caution in acne.

Cubes of Sodium Peroxide. *Syn.* OXYLITH, "SOLID OXYGEN."
Have been used for generating oxygen.

P1 HYOSCINA.

$C_{17}H_{21}NO_4=303{\cdot}176$ (+Aq.).

A thick syrupy alkaloid, contained in *Hyoscyamus niger*, different species of *Scopola*, *Datura alba*, the flowers of which yield 0·5%, and other solanaceous plants.

It may be obtained from the Mother liquors of the preparation of Hyoscyamine. It is chemically and physiologically equal to Scopolamine. *We consider that all the compounds and preparations of this potent alkaloid in this chapter should be deemed* P1 *poisons.*

For further details of the chemistry of this and allied alkaloids, Thorpe should be consulted. See also Lævo-Scopolamine, p. 498.

Uses.—Hyoscine is a powerful narcotic, especially useful in cases of insomnia, in calming excitement and delirium and producing sleep in acute mania. In such cases even double doses may be given. It is said to have no influence on the respiration, but to increase the action of the heart and circulation. As little as $\frac{1}{480}$ grain dilates the pupil in 18 minutes. The mydriasis is brief. It does not cause dryness of throat. Should be avoided in acute glaucoma.

It is considerably employed as an adjunct to, or substitute for, ordinary anæsthetics in cases in which either light anæsthesia is required, or those in which the anæsthesia is 'likely to be prolonged and it is desired to restrict the ordinary anæsthetics as much as possible.'—B.M.J. ii./10,1451—being used largely in conjunction with Morphine in relieving the pains of labour. See p. 498, *et seq.*

CHOREA, ASTHMATIC ATTACKS, PERTUSSIS and PARALYSIS AGITANS are relieved.

Paralysis agitans treated. Pilocarpine neutralises the drying effect on the salivary secretion and on the intrinsic muscles of the eye without diminishing effect on the tremor. Give a mixture of Hyoscine 1/200 grain with Pilocarpine Nitrate 1/15 grain and min. iii. of Liquor Strychninæ four times daily, gradually increased until the tremor is controlled.—A. F. Hurst, B.M.J. i./26,845. *Vide also postea.*

It has been given in vomiting of pregnancy and the tremor of alcoholic excess.

MORPHINE and COCAINE HABITS are treated with it, but apparently not without danger.

NOCTURNAL SPERMATORRHŒA is checked by $\frac{1}{200}$ grain doses in Chloroform Water by the mouth.—W. W. W.

DIATHERMASIA (thermal stroke in the tropics).

Quinine is of no use if malaria has been excluded. Strychnine should be avoided. The patient should be placed in an ice pad, and a hypodermic injection of $\frac{1}{75}$th grain of Hyoscine Hydrobromide should be given to quiet the intense cerebral hyperactivity. For thready pulse $\frac{1}{100}$ grain Digitalin is useful. After diaphoresis small doses of Ammonium Bromide may be given. —Brooke.

As hypnotic not advised in cases other than maniacal as its action is uncertain. In PUERPERAL MANIA $\frac{1}{150}$ to $\frac{1}{50}$ grain may be given *by the mouth.* To quell mania dose of $\frac{1}{100}$ grain hypodermically has proved useful. Kidney disease and feeble state of heart do not contra-indicate its use. In PARALYSIS AGITANS $\frac{1}{250}$ grain removes tremor.—Pr. Nov. 10,733. On discontinuing the medicine, however, these symptoms return, and again it often fails.— W. W. W.

SEPTIC PNEUMONIA and INFLUENZA may be cautiously treated for sleeplessness.—Sir J. Moore, Pr. January, 1919.

ACUTE MANIA. The following heavy doses are tolerated:—Chloral Hydrate 45 grains, Potassium Bromide 30 grains, Hyoscine Hydrobromide 1/40th grain in water to one ounce when required. (*Caution*—heavy dose). After a few doses the medicine may cease to have effect, even when the Hyoscine is increased to 1/20th of a grain. A hypodermic injection (10 minims of a ¼ per cent. solution) of Hyoscine will, however, often subdue.—B.C.D. i./13,630.

Hyoscine possesses about 5 times the calmative power of Atropine or Hyoscyamine.

Complete anæsthesia effected by $\frac{1}{40}$ grain in two blacks in Rhodesia.— Regarded as a maximum dose.—L. ii./10,884.

Hyoscine 1/150 grain, Morphine 1/3 grain. Anæsthetic for the Alcohol injection (*q.v.*) treatment of neuralgia. Give 20 minutes prior to the Alcohol. —W. Harris, L. i./13,881.

DELIRIUM TREMENS. Hyoscine 1/50 grain with Morphine 1/3 grain. A sheet anchor, but may be cumulative.—W. Starkey, B.M.J. i./20,47. (*Caution*: 1/50 grain is a big dose.—W.H.M.).

POST-ENCEPHALITIC PARKINSONISM. Hyoscine Hydrobromide produces quite definite and even marked improvement.—A. J. Hall, B.M.J. i./26,129.

Antidotes — Pilocarpine or Caffeine should be administered, also Tannin and Tea, after Emetics and use of stomach pump.

Hyoscine poisoning in a five-year-old boy. The child had eaten several tablets, each containing $\frac{1}{100}$ grain of Hyoscine Hydrobromide, and was unconscious when the doctor arrived. An injection of ¼ grain of Pilocarpine Hydrochloride improved the condition of the boy within ten minutes, and next morning a complete recovery resulted.—L. ii./10,884. *See also Vol. II.*

P1 **Oleum Hyoscinæ,** 1% in Castor Oil. Causes a mydriasis which is certain, quick in onset and of transient effect. **P1** **Unguentum Hyoscinæ, R.O.H.** Hyoscine base $\frac{1}{2}$, Soft Paraffin 100.

P1 **Hyoscinæ Hydrobromidum** *Syn.* **Scopolaminæ Hydrobromidum,** *B.P.* '14, **U.S., Ph. Ned. V.** P. Jap. $C_{17}H_{21}NO_4.HBr.3H_2O$.

Dose.—$\frac{1}{200}$ to $\frac{1}{100}$ grain (**0·0003** to **0·0006 Gm.**), increased to $\frac{1}{50}$ grain.

In white rhombic crystals, soluble 1 in 4 of water (or less), 1 in 14 of alcohol. Melts at 190° to 192° C. U.S.

P.G. VI. has maximum single dose 0·001 Gm., maximum *pro die* 0·003 Gm.

N.B.—As initial dose we advise $\frac{1}{400}$ or $\frac{1}{300}$ grain. Patients vary in reaction to this drug.

The pure salt (water free) has, according to Schmidt, O.R. for a 6·5% solution at 15·8° C. $[\alpha]_D = -25° 45'$. Commercial Hyoscine Hydrobromide, though often less lævo-rotatory than this owing to presence of dextro or racemic Scopolamine, according to some does not differ markedly in physiological effect from that of pure **Lævo-Scopolamine.**

A recent statement, however, is that only *l*-Hyoscine is active in producing amnesia; Dextro is useless.—J. Chassar Moir, B.M.J., ii./25,514.

P.G. VI. requires a 5% aqueous solution, calculated as anhydrous salt, to have a rotation: $[\alpha]_D$ at 20° = —24·75°. On adding 1 drop of potassium permanganate solution (0·1%) to 5 Cc. of a 1% aqueous solution, the red colour should not disappear within 5 minutes (apoatropine).

Jowett thought that as both Lævo- and optically inactive Scopolamine occur in the plant, preparations may vary according to slight differences in ways of making.—P.J. i./13,401.

Resolution of Hyoscine and its components Tropic Acid and Oscine. There are possible four isomeric hyoscines.—H. King, C.D. '19,348.

P1 **Guttæ Hyoscinæ, R.O.H.,** 0·5%.

P1 **Lamellæ** for ophthalmic use contain $\frac{1}{600}$ (R.O.H.) and $\frac{1}{200}$ grain.

D **P1** **Guttæ Hyoscinæ et Cocainæ, St. Th. H.** Hyoscine Hydrobromide 0·5, Cocaine Hydrochloride 1·0%.

P1 **Injectio Hyoscinæ Hypodermica.** 1 grain in 1,000 minims. *Dose.*—5 to 10 minims.

P1 **Liquor Hyoscinæ Hydrobromidi,** 1 in 1,000 of chloroform water. *Dose per os*—3 to 15 minims (**0·2 to 1 Cc.**).

Scopolamine Hydrobromide solutions stated to keep better by addition of a large amount of a polyhydric alcohol, *e.g., Mannite.* Thus Scopolamine Hydrobromide 0·2 Gm., Mannite 100 Gm., Distilled Water to 1 litre. The solution to be sterilised.—P.J. i./15,299. The authors have never had the slightest complaint of this liquor made with chloroform water.

P1 **Pilula Hyoscinæ Hydrobromidi,** $\frac{1}{400}$ to $\frac{1}{150}$ grain.

P1 **Hypodermic Tablets,** $\frac{1}{400}$, $\frac{1}{200}$, $\frac{1}{100}$ and $\frac{1}{75}$ grain in each.

Severe poisonous effects from $\frac{1}{12}$ grain.—L. i./04,24.

For general ***uses*** and References to Hyoscine Salts *vide* Hyoscine *antea.*

Scopolamine-Morphine Anæsthesia.

Scopolamine Hydrobromide $\frac{1}{200}$ to $\frac{1}{64}$ grain or more, and a salt of Morphine $\frac{1}{7}$ to $\frac{1}{2}$ grain are injected on the evening before the operation, and a similar or higher dose in the morning before the operation. This alone may suffice to produce deep sleep. If not, Ether or Chloroform may be given until complete anæsthesia occurs. Patients sleep for hours through the first painful periods after the operation.

One of the physiological effects of Scopolamine is to induce temporary loss of memory. This is made use of in the "Twilight Sleep" method of inducing child-birth.

The only successful method of inducing "Twilight Sleep" is to give doses according to the needs of the hour. Hypodermic injection of Morphine $\frac{1}{6}$ to $\frac{1}{4}$ grain most commonly used. First dose of Scopolamine 1/150 grain; at the end of one hour a second injection of 1/450 grain is given—this latter amount is injected at intervals (about every hour) controlled by the patient's condition. The number of the Scopolamine injections matters little. *The Morphine must not be repeated.* One of the most gratifying features is the marked absence of maternal shock afterwards. Patients do not complain. The child is usually born with a shallow respiration, but artificial respiration will improve breathing. A little Chloroform administered by the Junker Apparatus used in the late second stage, and when the head appears give $\frac{1}{4}$ or $\frac{1}{2}$ Cc. of Pituitary Extract.—A. W. Bourne, Clin. Jl., Dec. 19/23,601.

Scopolamine-Morphine-Atropine Methods :—

Morphine $\frac{1}{6}$ grain with Scopolamine, $\frac{1}{100}$ grain has been given the night before operation, after thoroughly emptying the bowel, and next morning after a rectal enema a further dose of the same quantity, and an hour before operation, *Atropine* $\frac{1}{100}$ *grain with Strychnine* $\frac{1}{36}$ *grain* is given subcutaneously. Less Chloroform is needed. Used in the most serious abdominal and pelvic operations.—L. i./11,737; B.M.J. i./11,757.

Dudley Buxton is of opinion that Atropine is an essential when 'open Ether' is used, as although Scopolamine produces similar effects yet when combined with Morphine its action in that direction is insufficient to counteract the injurious results of unstinted doses of Ether.—L. i./11,737.

Patients usually pass into profound sleep when the operation is finished, hence need watching for some hours, indeed until the narcotic effects have passed off. As the respirations are slow and shallow, time must elapse for the action of the drugs to pass off. The stupor need not alarm if breathing is regular and adequate, and albuminuria or glycosuria are known not to be present.—B.M.J. ii./11,1150.

So long as complete amnesia and not analgesia is aimed at and maintained there is no risk to either mother or infant. If pushed to the slightly further stage of analgesia the risk may be grave. Remarkable absence of exhaustion and shock upon the mother.—W. O. Greenwood, B.M.J. i./17,355.

Stovaine intraspinally 0·5 to 0·7 Cc. of 10% solution combined with twilight sleep in gynæcology.—F. L. Provis, L. i./18,152.

Twilight Sleep not free from danger. Consensus of views.—G. Blacker. L. i./18,430. See also B.M.J.E. i./15, 11; ii./15,3.

Crile's Anoci-Association *i.e.*, the exclusion of all harmful associations or stimuli. Scopolamine Morphine employed also Novocain Infiltration with Solution 1 in 400. In abdominal work Quinine Hydrochloride and Urea 5% of each in Normal Saline.—H. B. Butler and E. W. Sheaf, B.M.J. ii./14,113.

Morphine alone, 1/6th grain hypodermically, repeated at various intervals throughout labour, satisfactory. The progress of the labour was found to be hurried rather than delayed.—Louise McIlroy, B.M.J. i./21,159. Endangers child's life when given repeatedly up to shortly before birth.—H. Spencer—*ibid*, 159.

In the Morphine-Scopolamine Method the child was born in 3% of cases oligopnœic—of a blue colour with very shallow breathing. In each case it

recovered spontaneously—Morphine not necessarily the cause.—F. W. N. Haultain, B.M.J. i./21,341.

Specially indicated in primiparæ (experience of 140 cases). Chloroform only to be given at the very end of the second stage. Postpartum hæmorrhage not more frequent than usual.—N. Hirschman, B.M.J. ii./22,669.

Main objection is the effect on the child, vigilance necessary. Notes on 75 cases. Scopolamine 1/150 grain and Morphine 1/3 grain; the former repeated in an hour. Results generally good.—H. M. Gerson, L. i./22,428.

We have been informed that Twilight Sleep has proved *far from satisfactory.* Diamorphine Hydrochloride found to have some analgesic effect, but when given in sufficiently large doses inhibited uterine contractions. Only slight analgesia obtained by $\frac{1}{8}$ grain in the cases tried and 1/6 grain thought to definitely delay labour. Phenazone and other analgesics by mouth proved of little value. Heroin is claimed also to have an amnesic effect but this was not substantiated. A drug is needed which would give amnesia or analgesia without depressing uterine function.—Allan Vincent.

It occurred to us to suggest Hyoscyamine, as an alternative to Hyoscine. Personally, we are not surprised to find that the Morphine derivatives tend to inhibit uterine contraction. The recent use of Quinine in this matter is of interest, *v.* p. 107.

Investigation of 32 cases by a Committee appointed by the Section of Obstetrics and Gynæcology of the R.S.M. in 1917.—The average number of injections of Scopolamine was 4·5. Pituitary Extract 0·25 Cc. was given in 17 cases in the second stage. The average duration of labour after commencement of treatment was 5 hours 41 minutes in primiparæ and 6 hours 5 minutes in multiparæ. The injections caused lengthening of intervals between contractions which were diminished in strength and duration: voluntary expulsive efforts did not arise automatically: there was thirst in every case, and nausea in some: some complained of pain in second stage: there was sleep between pains in every case: general anæsthesia was induced in 10 cases. One stillbirth resulted, most babies showed apnœa, and all were thirsty for 24 hours. Amnesia and not analgesia the aim. Amnesia was complete in 17 cases, incomplete in 12, and failed in 3. The treatment is good for the mother but needs unremitting attention from doctor and nurse. No danger with careful observation. The memory test is useless. Strict precautions must be taken to exclude all adventitious stimuli.—J. St. G. Wilson, M.P.C., Nov. 16, '27,407. *See also Gwathmey's Synergistic Theory (Magnesium Sulphate and Morphine), p.* 107.

𝔇 𝔓1 **Sterules and Tablets, Hypodermic for Scopolamine-Morphine Anæsthesia** contain Scopolamine Hydrobromide $\frac{1}{100}$ grain with Morphine Hydrochloride $\frac{1}{6}$ grain in 15 minims.

𝔓1 **Sterules of Atropine Sulphate** $\frac{1}{100}$ grain with **Strychnine Sulphate** $\frac{1}{30}$ grain in 10 minims are for use with these as above mentioned. They are also made with $\frac{1}{60}$ grain of Strychnine Sulphate.

𝔇 𝔓1 **Compound Scopolamine (Hyoscine) Sterules** contain Scopolamine $\frac{1}{120}$ grain and Morphine $\frac{1}{8}$ grain with Atropine Sulphate $\frac{1}{120}$ grain in 15 minims of water.

𝔇 𝔓1 **Compound Scopolamine (Hyoscine) Tablets** contain the same ingredients as the last.

Scopolamine in obstetrics.—Jl. A.M.A. ii./25,1155.

𝔓1 **Scopolamine Hydrochloride** ($+2H_2O$) and 𝔓1 **Hydriodide** have properties and doses analogous to the Hydrobromide.

Genoscopolamine. Stated to be the Nitrogen-oxide of Scopolamine.

Dose.—2 to 4 mgr. ($\frac{1}{30}$ to $\frac{1}{15}$ grain) *during a day.*

Genoscopolamine Granules are made, each containing 0·0005 Gm. *Dose* 4 to 8 granules *per day* agreeing with the above.

In Parkinsonism it reduces rigidity, muscular hypertonus, tremor and excessive salivation. This substance has a therapeutic action similar to Scopolamine but is less toxic—the administration may be continued for months.—M. Polonovski and others, L. i./26,929.

ⓅHYOSCYAMI FOLIA.

Jusquiame.—Fr. Cx. *Dose.*—3 grains (0·2 Gm.) U.S.

Henbane Leaves consist of the fresh leaves; also the leaves and flowering tops separated from the branches and carefully dried. Collected from the flowering plants.—*B.P.* '14, not standardised, *cf.* U.S., etc., *infra.* The *B.P.* '14 leaves conform with F.I.

Cultivation.—For details see Vol. II.

Uses.—Similar to those of Belladonna and Stramonium.

Colocynth and other strong purgatives in pills are rendered less painful in action by addition of Hyoscyamus Extract.

Hyoscyamus (Tincture) contains varying amounts and proportions of Hyoscyamine and Atropine and a varying amount of lævo and inactive Scopolamine. The physiological activity of stereoisomerides varies.—H. A. D. Jowett, P.J., i./13,401.

U.S. directs dried leaf with or without tops, containing not less than 0·065% alkaloids and not more than 25% of stems, none more than 7 mm. thick. **P. Helv.** required 0·1% alkaloids.

P1 Extractum Hyoscyami (*B.P.* 14).

Dose.—2 to 8 grains (0·12 to 0·5 Gm.).

This differs from **Extractum Hyoscyami Viride**, B.P. '98. It is an alcoholic extract of the leaf, made with 70% Alcohol and conforming with F.I., and is standardised (*B.P.* '14) to 0·3% alkaloids. U.S. X. has 0·25%. Glucose is used as diluent.

Hyoscyamus Extract contains 0·3% mydriatic alkaloids, including Atropine, and any preparation of Belladonna containing 0·1% or more is a Part I. Poison.—Rutherford Hill, P.J. i./26,13. We agree. *Cf.* note under Hyoscine.

P.G. VI. Contains 0·5% Hyoscyamine.

ⓅTinctura Hyoscyami (*B.P.* '14).

Dose.—½ to 1 drachm (2 to 4 Cc.). Powdered Hyoscyamus leaves 1 in Alcohol 70% to 10. This conforms with F.I.

Flavoring.—Syl Aurantii Amari, Syl Vanillæ; Syrupus Aurantii Floris.

The pain due to pyelitis may sometimes be controlled by Hyoscyamus Tincture in doses of ½—1 drachm.—Tirard.

Baume Tranquille. Fr. Cx. (Huile de Jusquiaume Composée). Macerate powdered leaves of Belladonna, Hyoscyamus, Solanum Nigrum, Poppy and Stramonium of each 50, with alcohol 200, and allow to stand 24 hours: then add Poppy Seed Olive Oil 5000, warm for 6 hours at 60 to 70°C. Press and allow to deposit, and finally add Oils of Lavender Peppermint, Rosemary and Thyme, of each 1, and filter.

ⓅFluidextractum Hyoscyami, U.S. *Average dose.*—3 minims (0·2 Cc.). Strength 1=1; hydro-alcoholic percolate, standardised to 0·065% Hyoscyamus alkaloids.

The dried leaves are said to contain as much as 0·25% of total alkaloid (of which ¼ to ¾ may be Hyoscyamine) together with small

amounts of Hyoscine and Atropine. The minute dark grey seeds of the plant contain 0·5% alkaloid, also a quantity of oil.

FR. CX. employs the seeds in 🄿 P1 Pilules de Cynoglosse opiacées.

Hyoscyamine is also contained in *Atropa Belladonna, Duboisia myoporoides, Datura Stramonium, Scopola Carniolica, S. Japonica,* and other atropaceous plants.

Hyoscyamus muticus. **Egyptian Henbane** has been found to contain 0·91% Alkaloids by titration. Costs less than 1/20 of the medicinal drug. Has been imported in America and diluted with inferior Henbane, as it contains 1 to 1·25% Hyoscyamine. It grows wild all over Egypt, where it is known by the name of 'Sakran,' the drunken. The alkaloid it contains is practically pure Hyoscyamine.

It is now a drug of extreme importance as a source of Atropine—the hyoscyamine contained is easily converted into Atropine,—*vide* Hyoscyamine *infra.* The Germans had the astuteness to corner supplies in Egypt and sell the Atropine to us at fancy prices.—The late Gordon Sharp, P.J. ii./17,108.

This lævo- Hyoscyamine has been suggested to replace Atropine for ophththalmic work—*vide* Atropine.

Ⓟ**Meglin's Pills.**—Hyoscyamus Extract, Valerian Extract, and Zinc Oxide each 1 grain.—In sciatica.

Lactucarium, U.S. IX. *Average dose.*—15 grains (**1 Gm.**).

The concrete milk juice of *Lactuca virosa* (*Compositæ*), the strong scented lettuce. Hyoscyamine is said to be a constituent of the fresh plant. Brownish masses with Opium-like odour and bitter taste, partly soluble in Alcohol and in Ether. **Tinctura Lactucarii, U.S.** 1 in 2. *Average dose.*—30 minims. **Syrupus Lactucarii U.S.** (1 in 20). Tincture of Lactucarium, 100, Glycerin 200, Citric Acid 1, Orange Flower Water 50, Syrup to 1,000. *Average dose.*—2 drachms for insomnia.

The Iron content of lettuce is said to vary from 0·00972% to 0·00033%, the variety richest in Iron content being "May King," and the poorest, the Cos Lettuce. Description of estimation.—A. Lichtin, per P.J. i./23,358.

P1 HYOSCYAMINA.

$C_{17}H_{23}NO_3$=289·192.

Dose.—$\frac{1}{200}$ to $\frac{1}{100}$ grain (**0·0003 to 0·0006 Gm.**), in cases of mania, increased to $\frac{1}{16}$ or $\frac{1}{8}$ grain dissolved in water by means of diluted sulphuric acid, or in a pill. ***Antidotes.*** *See* Atropine.

An alkaloid obtained from *Hyoscyamus niger* and other Solanaceous plants. It is a stereo-isomer of Atropine (which is inactive), into which it can be converted by heating or acting upon it with alkali. It is in light snow-white crystals. O.R. of Solutions of Hyoscyamine is $[\alpha]_D = -20·97°$.

Soluble 1 in 120 of water, freely in alcohol, chloroform and ether. Is alkaline in reaction, and melts at 108°—109° C.

It has been found in *Scopola Japonica*—*q.v.*

P1 **Hyoscyaminæ Hydrobromidum,** $C_{17}H_{23}NO_3HBr$ = 370·116. *Dose.*—$\frac{1}{200}$ to $\frac{1}{100}$ grain (**0·0003 to 0·0006 Gm.**), increased.

In small white crystals, soluble about 2 in 1 water.

Does not yield precipitate with platinic chloride (difference from most alkaloids) U.S. M.pt. 152°C.

Ⓟ**Hypodermic Sterules** of **Hyoscyamine Hydrobromide** contain $\frac{1}{100}$ **grain (0·0006 Gm.) in 15 minims. (1 Cc.).**

P1 **Hyoscyaminæ Sulphas** (*B.P.* '14).
$(C_{17}H_{23}NO_3)_2H_2SO_4,2H_2O = 712{\cdot}496$.
Dose.—$\frac{1}{200}$ to $\frac{1}{100}$ grain (**0·0003 to 0·0006 Gm.**).

In small white granular deliquescent crystals, soluble in water 2 in 1 and about 1 in 4 of alcohol 90%.

P1 **Hypodermic Tablets of Hyoscyamine Sulphate** contain $\frac{1}{100}$ and $\frac{1}{50}$ grain. P1 **Ophthalmic Discs** contain $\frac{1}{5000}$ grain.

P1 **Guttæ Hyoscyaminæ** (*vel* **Daturinæ**) **R.O.H.** 0·25%.

P1 **Granules of Hyoscyamine** $\frac{1}{100}$ grain (**0·0006 Gm.**) are used for sea-sickness. *Dose*, one occasionally a day or so beforehand, and for the first few days on board; hourly if required.

Uses.—As a mydriatic it acts like Atropine, but with greater intensity, while the duration of effect is about equal.

It removes the pain of neuralgia and is given for mental excitement, *e.g.*, delirium tremens. In mania $\frac{1}{8}$ grain may be given hypodermically.

Criminology.—Suggested use of hyoscyamine to extract 'the truth' from unwilling deponents. Could not be used in this country.—L. ii./22,1191.

P1 **Duboisine** from the leaves of *Duboisia myoporoides* is identical chemically with, and physiologically similar to Hyoscyamine. It is in amorphous very hygroscopic granules.

ICHTHOSULPHOL.

*ICHTHYOL (F. ITAL.). TRADE MARKS.—See 39599 (Class 2) and 39600 (Class 3), (Names and Designs). 59155, 6 and 7 (Classes 2, 3 and 48 respectively). *ICHTHYOLATE, No. 64841, and *ICHTHYOLICUM 64842. *Syn.* *SAUROLO (T.M. 324693). AMMONIUM SULPHO-ICHTHYOLATE. (**P. Belg. P. Jap.**)

PATENTS 10,523/1884 and 6044/1893 ***Expired.***

Dose.—10 to 30 grains (**0·6 to 2 Gm.**) per diem.

A viscous, brownish substance, with a disagreeable odour obtained by destructive distillation of a fossil fish deposits, and treating the basic oil thus made with sulphuric acid and neutralizing with ammonia.

According to a partial analysis the total Sulphur is 10·3% of which 8·92 is organically combined and 1·38 is in association with Ammonia. Total Ammonia 3·23%; 43·74% water.—L. i./13,328. Other refs. in 17th Edn.

Soluble in water, glycerin, ether, fats, oils, and partially in alcohol 90%.

Uses.—Internally has been given for rheumatism and skin affections, and as an intestinal antiseptic in constipation and dyspepsia. Reduces expectoration and cough in phthisis; also stated to be useful in whooping-cough. Externally it is used in chronic skin diseases, as eczema, psoriasis, acne, and favus. The odour may be disguised with Oil of Citronella, which is itself used in Ceylon for rheumatism. Applied on wool as vaginal tampon, and as pessaries and suppositories, and as injections 2 to 5% (Lock Hosp.) in gonorrhœa, cystitis and vaginal discharges. Also applied to cracked nipples and erysipelas. In furunculosis it has been well spoken of. For prurigo senilis a 30% solution in water is recommended; for pruritus and ulcers a 10% solution; may be combined with preparations of lead and mercury without the formation of sulphides. For burns it has been used diluted with zinc oxide or bismuth (the powder being spread evenly over the surface), or in ointment (10 to 50%). In mumps the swelling and pain are said to be rapidly relieved by inunctions of equal parts of Ichthosulphol and Lanolin. Wounds in war have been treated by it in conjunction with glycerin.

ERYSIPELAS in a large suppurating wound on the arm well treated by painting with Ichthyol and Glycerin *p. aeq.* covered with oiled silk. Simultaneously a mixture containing 2 drachms of Liquor Hydrarg. Perchlor. every four hours. Wound then dressed with hypertonic Saline. Same treatment for a bad case of boils from the trenches also successful.—B.M.J. i./16,201.

ALBUMINURIA is well treated by Ichthyol internally combined with B. Coli. injections.—F. J. Sadler, L. i./22,930.

GONORRHŒA treated by intramuscular injection of 2% solution Ammonium Sulpho-ichthyolate in doses of 3 Cc. every 2nd or 3rd day—diluted just before injection.—B.M.J.E., i./26,2.

Lithium and Sodium Ichthosulphol. *Dose of either.*—10 to 30 grains (0·6 to 2 Gm.) per diem. **Zinc Ichthosulphol** is for external use.

Capsules of **Ichthosulphol** and of **Lithium Ichthosulphol,** 4 grains (0·25 Gm.) each (or combined 2 grains of each). **Tablets** 2½ grains.

Collodion 7 parts, with Ichthosulphol 1 part, is used for eczema, erysipelas, and other skin diseases.

Mistura Ichthosulphol. *Dose.*—1 to 3 drachms in water.

Ichthosulphol 6, Simple Elixir 20, Water 10. Another form is Ichthosulphol 2, Peppermint Water 7½, Syrup 2½.

Pilula Ichthosulphol.

Ichthosulphol 2½, Compound Tragacanth Powder ½, Liquorice Powder 1½ grains. Make a pill, on hot plate if necessary.

With Lithium and Sodium Ichthosulphol less Liquorice will suffice.

Pessaries of Ichthosulphol, 10% strength, with Cacao butter basis are used for leucorrhœa, and 2 to 5% in gonorrhœa of the female. Also made with **Resorcin,** 3%. These must be made with Cacao Butter basis. *See also* **Ovules.**

Suppositories of Ichthosulphol may contain 3 grains (0·2 Gm.) with a basis of Theobroma 12 grains. The mixture must be almost 'set' whilst pouring into the moulds, otherwise may separate. The addition of beeswax is not desirable; indeed a large proportion will render the suppository quite insoluble. May also be made, *if for immediate use,* with **Glyco-gelatin basis.** Do not overheat the mass, or it may become insoluble. (*Physicians should specify which basis they prefer.*)

The following proportions stated to be satisfactory. Ichthyol 10, Glycerin 60, Gelatin 16, Water 14. The Gelatin is soaked in the water overnight first. —George Roe, C.D., July 2, '27, p. 49.

Tampons, Glycerin-Ichthosulphol 5, 10 and 20% *v.* Glycerin.

Unguentum Ichthosulphol may be made to contain from 20 to 50% with lanolin or with olive oil and lard. For psoriasis and erysipelas and blepharitis (5%). May be perfumed with **otto of rose** *q.s.*

Ichthosulphol Resorcin, contains Resorcin 10% for external use.

Ichthosulphol Paste for acne rosacea. Ichthosulphol 25, Carbolic Acid 2½. Dissolve in Warm Water 22½, and mix with Starch 50. Painted on the skin, quickly dries and is easily washed off.

Pasta Ichthosulphol et Olei Terebinthinæ.

Ichthosulphol 1, Oil of Turpentine 1, mix. Of value in chilblains.

Ichthosulphol Proteinate. ✱**Ichthalbin** (T.M. 223215). *Dose.*—¾ to 15 grains (0·05 to 1 Gm.).

According to one of the methods given in the Patent Specification 11,344/1897 now void, a solution of 10 kilos of Ichthosulphol is added to a solution of 10 kilos of Albumen in 60 litres of water. To the mixture a dilution of 900 Gm. Sulphuric Acid in 10 litres of water is added with constant stirring, and the precipitate dried and powdered or washed with spirit. We tried this and found it to give satisfaction. The washing with alcohol is an advantage.

A combination of ichthosulphol and albumen; an odourless and tasteless brown powder. Used internally for eczema, nervous intestinal affections and during convalescence from fevers.

Ichthosulphol Salicyl is a powder made with either 25, 33⅓ or 50% of sodium salicylate for psoriasis, acne rosacea and for rheumatic pains, and has been given internally in pills for tuberculosis.

✱**Ichthoform** (T.M. 222252, Class 2, and 222253, Class 3).

PATENT 9157/1899 lapsed in 1907.

Manufacture.—We have found the following satisfactory: Mix Ichthyolsulphonic Acid 200 Gm. with water 400 Cc. and add Formalin (40%) 25 Gm. Heat 10 hours on the water bath. Collect the precipitate, wash and dry at 100° C. A compound of Ichthosulphol and Formaldehyde, insoluble in water. Intestinal Antiseptic, *e.g.*, in tubercular diseases. *Dose.*—1½ to 5 grains (0·1 to 0·3 Gm.).

✱**Thigenol** (T.M. 260287) is similar but a sodium salt; a 5% ointment relieves eczema. Thigenol Soap contains 10%.

✱**Sphagnol** (T.M. 246705).—A native tar product produced from peaty deposits. In blepharitis, eczema, piles, sores and burns. Detergent and relieves insect bites in tropical countries. **Ointment** (10%), **Medical Soap** (15%), **Toilet Soap** (5%), and Shaving Soap 5%, and **Suppositories**, 3 grains for piles, are made.

INFUSA CONCENTRATA.

These preparations are made of such strength that one volume diluted with 7 of water approximately represent the official Infusions. Farr and Wright recommended dilute Chloroform Water (Chloroform 1 in Water 1,000) either (*a*) by **Macero-Expression** in which the amount of drug required per pint is macerated in 15 ounces of the menstruum in a closed vessel for 24 hours, strained, pressed, and the alcohol or tincture necessary then added and maceration repeated two or three times. The two latter liquors are evaporated and added to the first and made up to one pint. The third maceration may be omitted when dilute alcohol is used as menstruum, and for the second maceration only *q.s.* need be used to make the expressed liquids when mixed measure one pint. The dilute chloroform water is to be used to prepare diluted alcohol when this is employed as menstruum. (*b*) By **Repercolation** consisting in moistening half the drug with menstruum and percolating. The other half is then moistened and percolated with the first percolate—percolation being continued in a second percolator until 13 ounces (reckoned on pint formula) are obtained. Add the alcohol and any tincture, etc., in the formula and reserve. Complete the exhaustion. The weak liquors are evaporated and added to the reserved portion. The bulk is then made up to volume (1 pint).

When using diluted alcohol as menstruum simply percolate until 1 pint of percolate has been collected from the second percolator. This is the easier procedure. By whichever process they are made concentrated infusions must, to keep, *contain at least* 20% (*for export* 25%) alcohol.—W. H. M. 1% of Formalin Solution is also used as preservative, but Alcohol is better.

An Interesting Experiment.—In Nov. 1926 we pressed out the juice from some 8 lbs. of fresh watercress yielding nearly a gallon of liquor—the main object being to obtain the chlorophyll, with the idea of retaining the vitamins intact. It was not heated. Portions were preserved with Chloroform 1 in 200, Toluol 1 in 400, Glycerin 25%, Formalin 1 in 100, Benzoic Acid 1 in 400. They all remained absolutely sweet and unfermented for months.

For Watercress, see also Nasturtium.

Broom, by (*b*), but not very satisfactory. **Buchu,** by (*a*) using dilute alcohol and add tincture 1 ounce to each pint. Diluted, however, not equal to the fresh article. **Calumba,** by (*a*) heating finally to 85° C. for 5 minutes. **Cascarilla** by (*a*) adding 6 dr. (B.P.C. 12 dr.) tincture to a pint. Diluted as good as infusion. **Chamomile** (*b*), dilute with alcohol, adding 1 drop of oil for each ounce of flowers used. **Chiretta** (*b*), satisfactory. **Clove,** not satisfactory. **Cusparia** (*a*), good. Ⓟ**Digitalis** (*a*), will not keep more than one month —B.P.C. **Gentian Compound** (*a*), adding 2 drachms of orange and lemon tinctures to the pint. **Hops** (*a*), with alcohol Use old hops. **Orange** (*b*), adding tincture 1 ounce. **Orange Compound** (*a*), adding 1 ounce orange and lemon tinctures. **Quassia** (*b*). **Rhatany** (*a*), if with alcohol more body, but not like official article. **Rhubarb** (*b*). **Roses** (*b*), with acidulated alcohol. **Senega** (*b*), with alcohol and a little ammonia. A little wintergreen oil to be added to finished product. Deposits in time. **Senna** (*a*), with alcohol and add essence of ginger ½ ounce to pint. Diluted is as good as the fresh infusion. **Serpentary** (*b*). **Valerian** (*b*), with addition of ammonia (B.P.C. uses 0·3% strong solution). Diluted, is superior to the fresh infusion.—P.J. i./06,163 ; C.D. i./06,252. Yields of extractive.—P.J. i./05,435. **Infusum Cinchonæ Acidum** (*B.P.* '14). Cannot be produced in a concentrated form.

These remarks apply equally to the *B.P.* '14 Infusions, but Cusparia, Hops and Serpentary are now omitted.

Some experiments comparing concentrated Infusions diluted "1 to 7" with fresh Infusions showed clear advantage of the latter in general properties. The use of the concentrated preparations is unwarrantable.—Thomas Stephenson. P.J. i./11, 255.

Infusum Quassiæ Concentratum (as injection for threadworms in children) should contain no alcohol.—B.M.J. ii./11,52.

Tisanes.—Infusions or teas (usual strength 1 in 10) of herbs are largely used by the laity in France, Italy, &c Those mostly in use are :—*Tilleul* from flowers of *Tilia Europea*—Linné. German—*Lindenbluthen* (anti-spasmodic, diaphoretic) ; Senna and Manna (largely used) ; *Queues de Cerise*, cherry-stalks diaphoretic) ; Peppermint ; Tamarinds ; *Bourrache*, Borage-leaf tea ; Chamomile ; *Mauve* :—Malva Sylvestris, Marshmallow-flowers (demulcent) ; *Chiendent* couch-grass (kidney-tonic) ; Aniseed (both varieties), Linseed ; *Orge* (pearl-barley). A large number of other tisanes are prepared —Ph. Notes, France and Riviera. Several are contained in the FR. CX.

They form the basis of domestic therapeutics in France—virtually unknown here.—B.M.J. i./21,60.

IODOFORMUM.

TRI-IODOMETHANE. $CHI_3 = 393{\cdot}794$.

Dose.—½ to 3 grains (0·03 to 0·2 Gm.).

Manufacture.—By acting upon Alcohol with Iodine in the presence of Caustic Potash (or Carbonate) solution at about 70° C.

$$(6KOH + 4I_2 + C_2H_5OH = CHI_3 + HCOOK + 5H_2O + 5KI).$$

It is also produced by the electrolysis of an aqueous solution of Potassium Carbonate, Potassium Iodide and Alcohol.

The substance has characteristic odour and contains 96·7% Iodine.

The yellow crystals—if minute—will pass through a dredger. A precipitated form is also available. M.Pt. 119° C.

Antidotes.—Opiates, bromides, diuretics with 5 to 10% of Sodium Bicarbonate locally.

Internally we have known it to be badly tolerated—may bring out a rash or crop of angry spots.

Soluble 1 in 8 of absolute ether, 1 in 10 of ether (Sp. Gr. 0·735), 1 in 12 of chloroform, 1 in 95 of 90% alcohol, 1 in 14 of eucalyptus oil, 1 in 10 of collodion, 1 in 60 of vaseline and oil of almonds, and about 1 in 30 of olive oil. Almost insoluble in water, but dissolves 1 in 10 of Rubini's solution of Camphor, which disguises its odour.

Incompatible with calomel, silver and other nitrates, potassium chlorate, nitrites and methylated spirit.

Iodoformum Aromaticum is scented with Coumarin, 1 in 50.

To cover its odour it may also be mixed with Menthol, Phenol, Thymol, Oils of Anise, Eucalyptus, Geranium, Peppermint, Rosemary or Sassafras, about 1 or 2%.

To remove the smell from the hands, utensils, etc., rub with a little crushed linseed and wash afterwards.

Uses.—Antiseptic, anæsthetic and sedative. Useful in gonorrhœa and syphilis (non-irritant). For sores as dusting powder or ethereal solution. Insufflations (*q.v.*) are used in throat affections. The (10%) ointment is a useful dressing to wounds.

Taken internally, Iodoform decomposes, and iodine is soon found in the urine; being non-irritant has given good results in intestinal hæmorrhage, tertiary syphilis and cirrhosis of the liver, also to kill tapeworm. Tuberculous peritonitis has rapidly recovered under Mercury and Chalk ½ grain with Iodoform ½ grain thrice daily. Excessive administration may produce symptoms like those of exophthalmic goitre in susceptible persons.

Iodoform Oil (20 grains to 1 ounce of Olive Oil) is useful as dressing in early stages in recovery after operation for fistula—the oil facilitating packing with dressing.—The first few dressings in these cases are usually painful.

Oleum Iodoformi et Creosoti. *Syn.* HUILE CREOSOTÉE IODOFORMÉE.

Heat Olive Oil 70, to 120° C. for 10 minutes. When cold add Creosote 5, Guaiacol 1, and Iodoform 10, lastly Ether 30. Supply in sterile bottle.

Collodium cum Iodoformo.

Iodoform 1, Flexible Collodion 12. P. Jap. and Fr. Cx. 1 in 10. Acetone Collodion will dissolve 5%. A pigment to venereal sores.

Emulsio Iodoformi. *For injection into sinuses.*

Iodoform, in fine powder, 1 (Alcohol 90% *q.s.* to moisten. St. Barts., G.H.), Glycerin 7, Boiled Water 2. Mix well in above order.

Lister used simply 1 in 10 of glycerin as in L.H. In **Glycerinum Iodoformi, K.C.H.** (1 in 10) the Iodoform is washed with 1 in 20 Phenol. Most effective before caseation has occurred. For filling a cavity in the bone, after removing caseating tissue, Iodoform 1 and Boric Acid 4 is useful.

Injectio Iodoformi. *For Bladder Injection.*

Iodoform, in fine powder, 1, Mucilage of Tragacanth 2, Water 7. This is less irritating than the Glycerin Emulsion (should be diluted 20—40 times with warm water).

Gauze, Gauze Baudages, Wool, and Lint contain 5%, 10% and 20%, British made contain correct quantity.—G. Lenthal Cheatle.

In making **Gossypium Iodoformi**, P.Jap. IV. directs to dissolve Iodoform 1 in Liquid Paraffin 1 and ether 18, soak cotton wool 18 in same, press gently until of uniform colour and dry.

Insufflatio Iodoformi.

Iodoform 2, Starch (carefully dried) 1. In specific affections of the throat, antiseptic and mildly caustic.

𝔅𝔓1 Insufflatio Iodoformi Composita.

Iodoform 6, Boric Acid 6, Morphine Acetate 1.

Iodoform and Eucalyptus Bougies. Cereoli Iodoformi et Eucalypti.

Iodoform precipitated, 5 grains. Eucalyptus Oil 10 minims. Theobroma Oil 35 grains. To make a bougie 4 inches long. Used for acute gonorrhœa. When the symptoms have subsided, any remaining discharge may be treated by Zinc Sulphate injections.

Injectio Iodoformi Ætherea.

Phthisis has been treated by intravenous injection of Iodoform ¼ to ½ grain doses in 40% Liquid Paraffin in Ether. Strength 10 minims to contain ¼ grain of Iodoform. Cases received ⅓ grain every second day on an average—begin with ¼ grain to see how patient stands it. **Benzoyl Chloride** has also been used in place of Ether as solvent, and given by *intra-muscular* injection.

Iodoform 1/6 grain with Menthol 1 grain in Almond Oil 15 minims has also been used. **Sterules** of this are made.

Whooping cough has been treated by Iodoform intravenously. *Dose.*—1 and 1½ grains in 0·720 Methylated Ether.

Leprosy treated by ½ grain doses in a solvent of 3 minims Liquid Paraffin and 7 minims Ether intravenously.—L. i./14,1806.

Iodoform 5 grains, Cyllin 5 minims, Olive Oil ½ ounce in intrathoracic sepsis as packing.—W. Gordon and M. E. Gates, B.M.J. i./18,173.

Iodoform Varnish (Whitehead's).

Benzoin 4, Storax 3, Balsam of Tolu 1, Purified Ether 40; dissolve, strain, and add Iodoform 4. For surgical application.

Mencière's Solution 'A.' For embalmment of wounds. Iodoform 10, Peruvian Balsam 30, Guaiacol 10, Eucalyptol 10, Ether 100.

Changes the aspect of wounds, often of the most septic. Previous successive lavage with three antiseptics: Sublimate 1 in 1000, Carbolic 1 in 40, Hydrogen Peroxide 1 in 3. All germs and spores whether anaerobic or aerobic are not equally sensitive to the three.

This solution employed to soak wicks of gauze or injected into sinuses. His 'B' solution also used: differs from 'A' in the quantity of ether, which is 1000 instead of 100. May be used instead of or in absence of Hydrogen Peroxide. Powerful antiseptics but sparing cells—in contradistinction to Iodine which causes necrosis of cells and leaves a surface which is an excellent culture medium for bacteria.—L. i./15,269 · see also F. C. Madden, use amongst Turkish wounded, i./16,614.

Ophthalmic Lamels (Gelatin) contain $\frac{1}{1000}$ grain.

Pasta Iodoformi R.D.H.

Iodoform 6, Tannic Acid 1, Liquefied Carbolic Acid *q.s.*

Cinnamon Paste and Iodoform Paste are also used by Dentists and are understood to mean Iodoform Powder mixed into a paste with Cinnamon Oil. Used for treating septic root canals.

Pencils of Iodoform, the thickness of a No. 9 catheter, for uterine medication, are prepared with Iodoform 15%.

Pigmentum Iodoformi. *See* **Collodium cum Iodoformo** *antea.*

Suppositories contain 1, 3 or 5 grains in each with Oil of Theobroma *q.s.* For fissure of the anus and irritating hæmorrhoids.

Unguentum Iodoformi *B.P.* '14 is 1 in 10 Prepared Lard. The formula is unsatisfactory. Iodine is liberated and it turns a dark colour. Potassium Carbonate 1% added prevents this. R.O.H. has 15% in Soft Paraffin.

Unguentum Iodoformi cum Eucalypto. R.O.H. Iodoform 2, Eucalyptus Oil 18, Hard Paraffin 40, Soft Paraffin 40.

Petrolatum Iodoformi (10%). A useful surgical dressing to wounds.

Basic meningitis treated by inunction of Iodoform Ointment (15 grains to the ounce of vaseline), rubbed thoroughly into the back of the neck and posterior part of the scalp night and morning. Small doses of Potassium Iodide and Bromide. Within a week temperature reduced and symptoms relieved. The method, it is believed, would lessen mortality from meningitis.—L. i./11,24.

Pasta Moorhofi R.V.I.

Mix Iodoform 60, Cetaceum 40, Sesame Oil 40, and add 5% of a mixture of Carbolic Acid and Camphor, equal parts.

Collapsible Tubes (with Catheter attachment) of **Iodoform and Eucalyptus Ointment** of each 5%, and of **Iodoform 5% and Cocaine 2% Ointment** are useful for gonorrhœa. BP1

Iodoform-Acetone. A Styptic antiseptic liquid stated to be made by mixing Iodoform 10 Gm. with Acetone 100 Gm., adding 3 drops of Ammonia, allowing to stand 3 days and filtering.—P.J. i./17 209.

Iodoform Substitutes.

Thymol Iodide, U.S. *Syn.* **Aristol.** DI-THYMOL-IODIDE.

FR. CX. $[C_6H_2(CH_3)(C_3H_7)OI]_2 = 550{\cdot}056$.

ARISTOL: T.M. No. 93538 registered 1890. Removed by Order of Court.

PATENT: 5079 of 1889. Now public property.

Manufacture.—The following formula according to our work is better than the patent.

Dissolve Thymol 1·5 and Sodium Hydrate 1·6 in Water 50; into this pour with constant stirring a solution of Iodine 6 (probably 4 sufficient), Potassium Iodide 8, in water 50. Yield is about 2·9 from these quantities.

The name "Iodo-Thymol Iodide" given in the patent does not convey any correct impression. Our analyses indicate a body of the composition Di-Thymol di-Iodide.

A brown powder containing about 45% Iodine; must not be heated above 100° F. nor exposed to light. *Soluble* in Alcohol and Oils, insoluble in Water.

Incompatible with alkalis, Mercuric Chloride, Metallic Oxides or anything decomposing Iodides.

Used for psoriasis, lupus, eczema, and for ozæna; as dusting powder alone or diluted 5 to 50%. Ointments 2 to 10% and Pastes also employed. For blepharitis and conjunctivitis 10% in sterile Sesame Oil Solution is suggested, also for burns and ulcerations.

For skin ulcers with equal weight of dried Ferrous Sulphate.—L. i./09,1224.
Suppositoria (Theobroma basis), 1 grain in 15 grains for hæmorrhoids.
'Collapsubes' of Aristol Ointment 10% for venereal diseases of the urethra.

Formamin-Ethyl-Iodidum. $(CH_2)_6N_4C_2H_5I=296{\cdot}1$.

Suggested Dose.—**5 to 30 grains (0·3 to 2 Gm.).**

A combination of Hexamethylene Tetramine and Ethyl Iodide. In white crystalline scales or needles. *Soluble* 1 in 2 of Water, and about 1 in 40 of Alcohol 90%. May be of use as a urinary antiseptic having a more or less sedative action. It is apparently stable in aqueous solution. The author has prepared this compound, but it is not suitable for internal use. Physiological tests showed that injections of the substance caused cirrhosis of the liver in a guinea-pig. Locally may be useful as an antiseptic.

Formidin. (Capsules contain 5 grains.)

Stated to be METHYLENE-DI-SALICYLIC IODIDE $C_{15}H_{10}O_6I_2$. *Dose.*—1 to 5 grains **(0·06 to 0·3 Gm.)**

A white powder insoluble in water, alcohol and dilute acids.

It decomposes in the presence of alkali, hence used as intestinal antiseptic. Applied locally in skin affections. Its action said to be due to the splitting off of salicylic acid, formalin and iodine, but the iodine content is somewhat less than theory demands.

Formidin Gauze sterilised moist in 1 square yard and 5 square yards in glass jars, also in cartons.

Formidin Tape, ½ inch wide, 10 yards long, in glass jars; also 1½ inch, 5 yards.

Iodol.—*Syn.* TETRA-IODO-PYRROL. $C_4I_4NH=570{\cdot}744$.

GERMAN PATENT (35,130/1885) expired. *Not a Trade Mark.*

Dose.—**1 to 3 grains (0·06 to 0·2 Gm.).**

Brownish powder, containing 89% iodine, obtained by acting on pyrrol with iodine in presence of alcohol. It explodes if rubbed with mercuric oxide. Decomposes at 140° C.

Soluble 1 in 145 of glycerin, 1 in 6 of absolute alcohol, 1 in 21 of 90% alcohol, freely in ether; also in chloroform and oils. Insoluble in water.

Uses.—Painless wound dressing for buboes, ulcers, and ear discharges.

An ointment, 1 to 5 of Vaseline, and a solution, 3 parts to 35 of alcohol and 62 of glycerin, have been used for granular and chronic conjunctivitis with good results; and a solution of Iodol 1, Alcohol 3, Glycerin 21, as a pigment in diphtheria. Also Iodol 2, Menthol 1, Almond Oil 96, for throat spray or pigment.

1% of menthol covers odour of Iodol, and is said to render it more active.

'Collapsubes' with catheter attachment of Iodol ointment 5, with Eucalyptus oil 10% with soft Petroleum basis are made for treatment of gonorrhœa.

IODUM.

$I=126{\cdot}932$.

Manufacture.

The sea-weeds vary enormously in Iodine content, and only *L. digitata* ('Tangle Stem') and *L. stenophylla* are worth burning for Kelp. The varieties known collectively as *Drift Kelp* are richer than Cut Kelp. If properly burnt, the drift weeds ought to yield 25 to 30 lbs. of Iodine per ton. 12 lbs. per ton is, however, above the average for ordinary Drift Kelp. Very good Scotch Kelp yields Potassium Sulphate 14%, Potassium Chloride 18%, Sodium Chloride 14% Sodium Carbonate 4%, and Iodine 14½ lbs. per ton. When burnt into 'loose ash' these figures are respectively 13%, 18%, 6·8%, 3·4% and 28 lbs.

The mineral known as **Caliche,** the crude Sodium Nitrate of Peru and Chili, forms now by far the most important source of Iodine. It is present in the form of Iodate. Sodium Bisulphite is used to precipitate the Iodine from the mother liquors from which the Sodium Nitrate has been crystallised. As the power of production of the factories on the spot is in excess of the world's power of consumption the makers have combined to restrict the output, Iodine only being made for a few months during the year. The cost of recovering Iodine as a by-product in this way is not more than 1½d. or 2d. per ounce.—Thorpe. *It is a pity, therefore, that users have to pay the enormous 'ring' prices existing for this invaluable chemical.*

For further notes on the History of Iodine and the Kelp Industry, see Vol. II.

The following medicinal inorganic iodides contain the halogen approximately in these proportions:—Ammonium Iodide (NH_4I) 87·5%, Lithium Iodide (Anhydrous) (LiI), 94·75%, Potassium Iodide (KI) 76·4%, Rubidium Iodide ($Rb I$) 59·75%, Sodium Iodide ($Na I$) 84·6%. Strontium Iodide ($Sr I_2 + 6 H_2O$) 56·45%.

Soluble.—In Water, 1 in 5,000, readily in Alcohol 90%, Ether 1 in 4, Chloroform 1 in 30 about, slightly in Glycerin. Very soluble in Potassium Iodide Solution.

For Iodine Assay and the 'Iodine Number' of Fats, etc., see Vol. II.

Antidotes.—Stomach pump, Emetics (Apomorphine Injection), Starch, Saccharated Solution of Lime, demulcents and stimulants; finally, Opiates.

Sodium Hyposulphite would be best chemically. Sodium Tetrathionate is formed, which is stated to be non-toxic. A 10% solution will combine (decolorise) ½ its weight of Tinctura Iodi Fortis *B.P.* '14. Let the patient sip a solution during intervals of vomiting.

Skin rash due to Iodine may resemble variola.

Incompatible with alkalis, alkaloids, starch, soluble lead and mercury salts, carbolic acid, chloral hydrate and sodium thiosulphate.

Uses.—Internally is variously used as Tincture *q.v.* in influenza, catarrhs, epilepsy, and to reduce obesity. Typhoid has been well treated with it combined with a little Phenol as a drink.—*Vide* Tincture.

Externally.—Irritates the skin, if too strong will blister. As counter-irritant painted on chilblains, over inflamed joints, spots of pleurisy, sore gums and scrofulous glands, to abort boils, and is injected as tincture to cure hydrocele, *cf.* also Morton's Fluid for spina bifida. For ringworm (*cf.* Coster's Paste). Is inhaled to check profuse expectoration in chronic bronchitis.

Iodine is a powerful germicide. A 1% solution has been stated to be equal to Mercuric Chloride 0·5%. *Cf.* **Skin Sterilisation** *postea* and Chapter on Antiseptic Powers, *Vol. II.*

Catgut (*q.v.*) is sterilised by immersion in 1% alcoholic solution.

Burns are well treated by a 2% alcoholic solution of Iodine.

In puerperal sepsis as a douche—*vide* **Injectio Iodi**.—C. H. W.

References to literature. See p. 516.

Intravenous Iodine Injection.

The following have been used: Iodine 1 drachm, Potassium Iodide 1 drachm, Distilled Water 5 ounces, 2 drachms. *Dose* (adult).—3 to 6 minims intravenously.—J. C. Chaudhuri, I.M.G., Feb. '25,90. It would be better ***diluted*** as *e.g.*, in the following:

PNEUMONIA and cellulitis have been treated with initial dose of Tincture 20 minims (1·2 Cc.) in 10 Cc. of Normal Saline, increased by 10 or 20 minims, according to reaction, up to 60 minims.—A. B. de Castro, I.M.G., Mar. '25,141. See also S. N. Datta, I.M.G., Dec. '25,579. *See also* Jl. Trop. Med. Sept 1, '27,225.

Pneumonia, erysipelas, cellulitis, rheumatism, septic wounds and bad cases of phagedaenic ulcers well treated. The formula used was as follows : Iodine 24 grains, Potassium Iodide 36 grains, Distilled Water to 1 ounce. *Dose,* 1 to 2 Cc., diluted with 8 Cc. distilled water and given once or twice weekly.—E. Burke, B.M.J., ii./27,1062.

KALA-AZAR treated by a solution containing Iodine and Potassium Iodide, of each 6 grains, Distilled Water to 1 ounce, approx. 1 grain in 80 minims (5 Cc.)—this was recommended by Maj. Brachio, I.M.D., in the I.M.G., July '23, 312.

MALARIA and a variety of other diseases have been treated.

Ⓟ Chloroformum Iodi, 1 in 30.

Stains less and does not promote desquamation, itching or dermatitis like alcoholic solution.

Glycerinum Iodi.

Iodine 1, Glycerin 50. Heat carefully till dissolved,—some decomposition of glycerin takes place. A useful pigment, the skin does not harden by repeated application, nor peel off. Water helps solution, *cf.* Morton's Fluid.

For ***internal use*** this preparation is quite suitable diluted with water with which it mixes temporarily. *Dose.*—On lines of the Tinctura Iodi Fr. Cx. (Bird's 'intensive') method of use. It is approx. $\frac{1}{5}$ the strength.

Glycerinum Iodi C.X., is Morton's Fluid, *sine Aqua.*

Injectio Iodi Hypodermica Fortissima.

Iodine 360 grains, Potassium Iodide 360 grains, Distilled Water $4\frac{1}{2}$ drachms. Should measure exactly 1 ounce and contain $\frac{3}{4}$ grain free Iodine in each minim. *Dose.*—3 to 5 minims for fibrous bronchocele.

A grain of Iodine may be held in solution in a minim of fluid, by employing Sodium Iodide in the proportion of Iodine 3, Sodium Iodide 2, and Water *q.s.* to 3 volumes.

Iodo-Glycerin Solution. **Injectio Iodi, C.L.T.E.** *Morton's Fluid.* *Distinguish from Douche which is also called 'Injection.'* Iodine 10 grains, Potassium Iodide 30 grains, Water 25 minims, dissolve, add Glycerin to 1 ounce. In spina bifida about 30 minims have been injected into the tumour, also injected into solid goitre.

Injectio Iodi, C.H.W., L.H. IODINE DOUCHE.—Weak Tincture of Iodine 2 drachms, Water 1 quart. For injection in puerperal sepsis.

Gangrene of the vulva, vagina and cervix treated by a douche of normal saline, cutting away the gangrenous parts, then giving a weak iodine douche, followed by packing with Balsam of Peru gauze.—B.M.J.E. ii./09,43.

Indiscriminate douching by women a great mistake.—W. E. Fothergill. B.M J. i./18,445.

Endometritis treated by swabbing and irrigation with a mixture of solution of Iodine (1 in 10) 1 part and Glycerin 7.—R. Hobbs, B.M.J. ii./21,35.

Iodum Oleatum. (*Not for internal use.*)

An Iodine-Oleic Acid compound containing 10% of Iodine. When thoroughly rubbed into any part does not stain the skin, but is rapidly absorbed, and its specific effect is soon apparent. Suitable for inflamed joints, enlarged scrofulous glands, skin affections, sciatica, sprains, chilblains ; should prove of value in tinnitus aurium.

Liquor Iodi (B.P. 1885).—*Syn.* LUGOL'S SOLUTION.

Iodine 2, Potassium Iodide 3 (U.C.H. has 2), Water 40.

Liquor Iodi Compositus, U.S. Iodine 5, Potassium Iodide 10, Water to 100.

Mistura Iodi Composita E.L.—Tincture of Iodine 1 minim, Glycerin of Carbolic Acid 1 minim, Caraway Water to 1 drachm.

Petrolatum Iodi.—*Iodine Jelly.* Contains 2% Iodine. Employed for 'plugging' with gauze in surgical operations.

P1 **Pigmentum Iodi et Aconiti.** *Syn.* TINCTURA IODI ET ACONITI.

Weak Tincture of Iodine 1, Tincture of Aconite (Fleming's) 1.

Periodontitis is relieved by Iodine, or Iodine and Aconite Pigment.

Pigmentum Iodi Æthereale.

Iodine ½, Alcohol 90% 3, Methylated Ether 2½. This dries rapidly.

Pigmentum Iodi cum Liquore Formaldehydi. Mid. H. 1927.

Weak Tincture of Iodine 13⅓, Formaldehyde Solution 1, Glycerin to 100.

Pigmentum Iodi et Olei Picis. *Syn.* PASTA IODI ET PICIS, COSTER'S PASTE.

Mix Iodine 1, Light Oil of Wood Tar 4, carefully, applying heat if necessary. Ebullition occurs and a part of the oil is oxidised and forms a resinous deposit.

Uses.—For ringworm of the scalp; after well shaking the bottle it should be well brushed in with a stiff brush; a scab will be produced which should be removed in a few days, the part cleansed by soaking with oil, and then soap and warm water; after drying, more paste should be applied. It seldom causes pain.

Iodine, Chloral Hydrate and Carbolic Acid, equal parts, have also been recommended for ringworm.

Pigmentum Mandl, T.H.

Iodine 6 grains, Potassium Iodide 20 grains, Oil of Peppermint 5 minims, Glycerin to 1 ounce. Used as a throat stimulant.

Iodised Absorbent Wool 6% in rolls. To prepare, saturate cotton wool with ether containing sufficient iodine for above strength, as also sufficient glycerin to produce 5% in the finished article and expose to dry. Is said to have saved life in a case of double pneumonia.

Syrupus Iodo-Tannicus (Martindale).

Dose.—½ to 2 drachms (2 to 8 Cc.), containing ⅗ to 2½ grains of Iodine, in water or wine.

Iodine 2, Tannic Acid 2, Glycerin 20, Water 30, Syrup (with flavourings and carminatives) *q.s.* to 100.

Combine the Iodine and the Tannin in presence of the water, glycerin and syrup *q.s.* until no indication of free Iodine with starch, cool and add the other ingredients. This contains the Iodine to a great extent in the form of Hydriodic Acid. (See 17th Edn., p. 501.)

The FR. CX. and PH. NED. V. Syrup is only ⅒ this strength, viz. 0·2% Iodine.

Uses.—Of great value for enlarged glands in children and also as a tonic after removal of tonsils and adenoids. Suggested in lymphæmia, anæmia, dysmenorrhœa and pulmonary affections.

Specially useful in cases of chronic lymphadenitis associated with or independent of adenoids. In atrophic rhinitis has given good results especially when combined with arsenic, and in simple bronchocele supplemented by the external use of Iodine Oleate or **Unguentum Iodi Intinctum** (*q.v.*). In arteriosclerosis it is often more valuable than Iodides or Thyroid preparations.

Syrupus Tann-Iodo-Phosphoratus.

Dose.—½ to 2 drachms. Contains 5 grains Monobasic Calcium Phosphate in 2 drachms of the Syrupus Iodo-Tannicus.—*Martindale.*

Vinum Tann-Iodo-Phosphoratum.

Dose.—½ to 2 ounces (containing 1 to 4 grains of Iodine). Is eight times weaker than the syrup above. These two preparations are elaborations of the Syrupus Iodo-Tannicus above, and are suitable as tonics for children and invalids.

Tinctura Iodi Fortis (*B.P.* '14). *Syn.* **Liquor Iodi Fortis, Strong Solution of Iodine** (B.P. 1898).—PIGMENTUM IODI, LINIMENTUM IODI (B.P. 1885).

This is 10% *w/v* and conforms with F.I. Its composition is Iodine 10, Potassium Iodide 6, Distilled water 10, Alcohol 90% to 100. It is slightly weaker than B.P. '98. U.S. is 7%.

Excess of Potassium Iodide in preparations of Iodine. The proportion or ratio of the two bodies has varied considerably. The ratio 3 grains of Potassium Iodide for every 5 grains of Iodine, as *B.P.* '14, is sufficient for rapid solution and this amount is economical.—T. E. Tawell. P.J. ii./13,837.

Tinctura Iodi (Mitis) (*B.P.* '14). *Dose* (for vomiting).—2 to 5 minims (0·12 to 0·3 Cc.).

Iodine 1, Potassium Iodide 1, Distilled Water 1; dissolve, add Alcohol (90%) *q.s.* to 40.

Should be recently prepared or is liable to contain Aldehyde and Hydriodic Acid. This aldehyde in presence of Iodine and water oxidises, forming more Hydriodic Acid as well as Acetic Acid. The Acetic Acid may become etherised forming Ethyl Acetate.—'Pharmacal Notes.'

A little Iodic Acid added to the Tincture will prevent decomposition—it breaks up Hydriodic Acid as formed.—P.J. i./14,713.

Flavoring.—Syl Lavandulæ, Syl Vanillæ; Syrupus Aurantii.

Antidotes.—See under Iodum.

References to Iodine Therapy, see p. 516, *and Skin Sterilisation, p.* 518.

Tinctura Iodi (***Sine Potassii Iodido***), TEINTURE D'IODE, FR. CX. 1908, P.Hung. (Sometimes called *Indian Tincture of Iodine.*)

Dose.—Max. Single (in FR. CX.) 0·25 Gm. (4½ minims), Max. during 24 hours (FR. CX.) 1 Gm. (18 minims.).

Usual Dose in Great Britain.—10 to 25 minims. According to Tom Bird (see Uses and Prescribing Notes) this dose can be given thrice daily in arthritis. (Usually first week, 10 minims. *t.d.p.c.*; second week, 20 minims; third week, 30 minims.)

Composition.—Iodine 1, Alcohol 95% (by volume), 9 by WEIGHT. (In making it *by volume* use 11·03 of the alcohol instead of 9 by wt.).

Sp. Gr. of the tincture is 0·888. 1 Cc. contains 0·089 Gm. Iodine. 10 minims contains 0·81 grains.

P.G.V. was similar. For P.G. VI. see p. 515.

Uses and Prescribing Notes.

This Tincture of Iodine is given as a tonic before meals in tuberculosis, also in the commencement of "la grippe" and ordinary colds; largely used on the Continent with excellent results. In vomiting of pregnancy invaluable, and small doses in sea-sickness.

The 'intensive Iodine Treatment' of tuberculosis with it, was the subject of extended research by L. Bourdreau, who found that large doses can be given by a gradual increase. He suggested that the method might be of use in other affections. Dr. Wm. Ewart, of St. George's Hospital, tried it for his own arthritis with result that instead of 'being unable to go upstairs one at a time, he could manage three at a time.' Tom Bird, L. i./20,546, states he had remarkable success in a number of arthritic cases and in cases of chronic gout and in cases called 'rheumatic gout.' As *much as 10 grains of Iodine per diem can be given in this way.* There may be slight catarrh of the nasal mucous membrane, but no iodism as from Potassium Iodide.

The Iodine is probably deposited in a fine condition on the mucous membrane of the stomach and therefore slowly absorbed.—T. Bird, Pres. Feb. '21, 190.

In taking the Tincture, the patient may place the dose (15 *drops* are equal to approx. 10 minims) in a glass and add 5 ounces ($\frac{1}{2}$ tumbler) of water to it. The dose may also be given in milk, in which an Iodo-Casein compound is formed.

The following makes a clear solution:

Tincture of Iodine Fr. Cx. 1908.
Spirit of chloroform. } Equal parts.
Glycerin.

Dose.—30 minims (2 Cc.)=approx. 1 grain of Iodine.

(**Glycerinum Iodi**, 1 in 50 (*v.*p.512), is miscible with water temporarily.)

It has been suggested (G. Walker, P.J. i./21,4, L. i./21,239) to use more of 90% Alcohol, as the 95% is not readily available. A further idea (Thos. Stephenson, Pres., Feb., 23,64) is to use the Tinctura Iodinei of the old Edinburgh Pharm.: 1 grain in 16 minims of S.V.R., beginning with a dose of 2 to 3 minims, but personally *we do not favour* upsetting the classic strength.

It is unfortunate, as the method of using the Tincture is in considerable vogue, that the 10% *w/w* preparation is now ***superseded*** by Fr. Cx. Supp. II. (1922), and the *title* of the Iodised Tincture of Iodine (Teinture d'Iode, iodurée) contained in the Supplement issued in 1920, is to be altered to Official Tincture of Iodine (**Teinture d'Iode Officinale**). This preparation is: Iodine 10 Gm., Potassium Iodide 4 Gm., Alcohol (90 per cent.) 136 Gm. (It contains $\frac{1}{15}$ of its weight of iodine).—P.J. ii./22,162; ii./22,609.

(The title '**Officinale**' is confirmed by **Fr. Cx. Supp Nouv. 1926.**)

We advise that ***unless otherwise directed the original 10% w/w of the Fr. Cx. should be dispensed*** for 'French Tincture.'

Prescribers should order "**Tinct. Iodi 10% (sine Pot. Iod.)**" to prevent misunderstanding.

A comparison of the Tinctures of Iodine of various countries.—M. Shaw and V. Cofman, P.J. i./23,453.

Tinctura Iodi, P.G. VI. is Iodine 7 Gm., Potassium Iodide 3 Gm. dissolved in alcohol 90% 90 Gm. Contains 6·8 to 7%. There is only one strength in P.G.

Tinctura Iodi Ætherea.

Iodine 1, Pure Ether 40. For skin diseases.

Tinctura Iodi Decolorata, B.P.C.

Iodine 2·85, Alcohol 90% 27·5. Dissolve with a gentle heat, and add when cold Strong Solution of Ammonia 6·25. Keep in a warm place until decolorised (it takes some days), after which dilute it with Alcohol 90% *q.s.* to 100.

A useful application for chilblains and for painting on exposed affected parts. The solution contains Ammonium Iodide and Ammonium Iodate.

Tinctura Iodi Decolorata Fortis was described in the Extra Pharmacopœia 12th edition and is occasionally ordered. It is prepared as above excepting that after keeping the mixture of Iodine, Alcohol and Ammonia in a warm place until decolorised it is not diluted at the finish with Alcohol to 100.

Decolorised Iodine Tincture, Belladonna Liniment, of each 25%, Soft Soap 50%. Useful for chilblains.

Tinctura Iodi Oleosa.

Iodine 1, Alcohol (90%) 9; heat to dissolve, and add Castor Oil 2. Repeatedly applied does not crack the skin as the tincture does.

Unguentum Iodi (*B.P.* '14).

Iodine 1, in 25 of a Potassium Iodide, Glycerin and lard basis.

The presence of Potassium Iodide (and Glycerin) is essential to the conservation of Free Iodine in this preparation. The Free Iodine content in the *Off.* Ointment is considerably reduced after keeping for two or three months. A simple mixture of Iodine and Lard becomes rapidly attenuated in Free Iodine content—by chemical addition.

Unguentum Iodi Intinctum, Stainless Iodine Ointment,—*Martindale.*

Iodine 1, Oleic Acid 4. Heat to effect absorption and mix with Soft Paraffin 14 and Hard Paraffin 1 previously melted together.

Possesses iodising properties (*cf.* Iodum Oleatum, the liquid equivalent) for use in rheumatic affections, enlarged glands, sprains, and syphilitic conditions.

✱**Kelpion** (T.M. 241134, 234570 and 224089) is a stainless Iodine preparation.

✱**Iodex** (T.M. 322589).—A stainless Iodine Ointment (containing 5%, together with a small proportion of free Iodine) to be rubbed on to the part or applied and covered with oiled silk and cotton wool. Also made with **Methyl Salicylate. Suppositories** are made containing $\frac{3}{8}$ grain Free Iodine in a neutral base.

Ⓟ**Vapor Iodi Ætherealis.**

Iodine 3 grains, Ether 2 drachms, Carbolic Acid 2 drachms, Creosote 1 drachm, Alcohol 90% 3 drachms. Ten minims to be used in an inhaler, *e.g.*, the 'Ozonic.' Thymol may be substituted for creosote.

References to Iodine Therapy.

(*For intravenous use, see p.* 511).

ENDOMETRITIS treated by **Churchill's Iodine Tincture** (dissolve Iodine 1,200 grains and Potassium Iodide ½ ounce in Water 4 ounces, then add Alcohol 90% to 16 ounces) applied subsequently twice a month for three months to the endometrium apparently diminishes the number of relapses following curetting.—B.M.J. ii./09,1030,1204.

VOMITING due to utero-gestation treated by Tincture of Iodine 5 to 10 drops with Syrup and Water.—Yeo.

MERCURIAL STOMATITIS. Iodine mouth-wash (½ drachm of the tincture to an ounce of water) useful.—Yeo.

Small amounts of Iodine in solution have been injected in ANTHRAX as also in ERYSIPELAS.

VARICOSE VEINS treated by injecting 1% solution of Iodine made with Potassium Iodide (Schiassi's Method).—L. ii./22,1288.

LUPUS.—Nascent Iodine has been obtained by internal use of Sodium Iodide and Hydrogen Peroxide locally on gauze tampons into the nose. Sodium Iodide in small dose at first (daily). At end of the week 30 grains in the 24 hours. Nasal cavities packed with gauze containing Hydrogen Peroxide, and a little Hydrochloride Acid and Ferric Chloride.—L. ii./12, 1784.

The method has also been used in laryngeal tuberculosis, and in war.

PHTHISIS.—E. C. Reeve gives an account of use of the method. 30 grains of Potassium Iodide are given at 7 a.m. in ½ pint of water Four hours later, 1 ounce of Chlorine Water in ½ pint fresh lemonade, repeated at 2 hours' intervals until sufficient has been given At first 3 ounces of Chlorine Water are given daily. At end of three weeks increase dose to 4 ounces of Chlorine Water and later to 5 ounces Slight headache may be produced Sputum, weight, temperature, sleep and appetite improved.—Pr., Sept.,'13 and June,'14.

TUBERCULOUS ULCERS and others treated by Sodium Iodide internally, 15 grains three times a day with Hydrogen Peroxide and a little Acetic Acid locally on Cotton Wool.—S. A. Pfannenstill, B.M.J., i./25,732.

TUBERCULOSIS.—Iodine as tincture *per os*, or as Hexamine Methyl Iodide intravenously, found of little value.—L. i./25,1039.

It is generally agreed that patients with systemic disturbance, especially febrile cases, improve rapidly. The administration of minute amounts of Iodine (1/10 or 1/5 grain every 5 days in butter-scotch) was found to give great improvement in pretubercular children when Cod Liver Oil, etc., had failed. Chronic bronchitis and allied conditions also respond well.—K. Fraser, Cumberland, School M.O. Report, 1925.

DEBILITY and MALNUTRITION cases among children do remarkably well on Iodine (usually Iodised sweets or Collosol Iodine).—K. Fraser, Cumberland, School M.O. Report, 1925.

A wonderful tonic for children, especially those of tuberculous tendencies, 2 minim doses of weak Tincture thrice daily in peppermint water. Improves appetite and imparts vigour.—H. E. Waller. Pres., April, 1917.

CORNEAL ULCERS treated by a 1 : 20 or 1 : 30 Tincture of Iodine after preliminary use of Cocaine. The Iodine is taken up on a probe or glass rod and held in the air a minute or two for the Alcohol to evaporate, then the ulcer touched with it. The Iodine is therefore almost solid and cannot diffuse.—Pres., Sept. /20,310, 311.

TYPHOID.—A mixture of equal parts of **Tincture of Iodine and Pure Carbolic Acid**—two or three drops in a tumbler of water by the patient's bedside, and renewed as often as required. The tongue cleared, temperature fell, diarrhœa ceased, the fever was cut short. The action is probably due to the iodising of the blood serum. It is not clear how the Iodine could exercise direct effect on the intestinal ulcers, unless it were first absorbed from the stomach and excreted later into the intestine. Had this treatment been used in the South African War many valuable lives would have been saved.—David Walsh, L. i./13,1346.

CYSTITIS treated by douche of 0·2% Tincture of Iodine. Non-irritating and efficient.—H. Lyon Smith, L. i./15,345.

FOR A COLD, Iodine 8 or 10 drops of 1% solution, twice daily, fasting, is specific.—Per Pres., Jan. '23,14.

EXOPHTHALMIC GOITRE.—Lugol's Iodine 15 minims produces great benefit. —J. W. McNee, L. i./26,551.

Exophthalmic Goitre treated with 30 m. of the 10% Alcoholic Solution of Iodine a day, increased in some cases to 60 m. or more.—F. R. Fraser, L. i./26,551.

Patients given 30 drops of Lugol's Solution daily for 3 days, and 40 or 50 drops for one or two days. They are able to take this pre-operative treatment at home. Causes so great an improvement that total hospitalisation is reduced to 5 days. Following operation, Lugol's Solution is given by the mouth and by proctoclysis to combat hyper-thyroidism.—A. S. Jackson, L. i./25,759,825.

In exophthalmic goitre symptoms and signs are lessened—maximum improvement after 2 to 6 weeks continuous treatment, when most cases relapse slowly and a low grade hyperthyroidism persists. Weight increased and B.M.R. reduced to normal limits in 1 to 6 weeks, when it rises slowly again. 5—10 minims three times daily for first few weeks and 5 minims may be continued in some cases for 6 months, reducing dose on increase of symptoms. Dangerous with abnormally firm thyroid, exceptionally severe nervous symptoms, or loss of weight in first few weeks' treatment.—L. B. Cole, L. i./27,815.

A little solid Iodine, say, 2 drachms should be placed in the dormitory in an open cup for youths up to the age of puberty as they frequently suffer from defective action of the thyroid, but usually additional small doses of Iodine are requisite.—Sir James Barr, B.M.J. ii./27,470.

IODIDE ERUPTION, a case of granulamatous form which is rare. Treatment was Sodium Chloride 10 to 20 grains three times daily after meals. Said to have been attended with dramatic effect in cases of Bromide eruption. Slow recovery.—H. C. Semon, L. ii./26,803.

BERI-BERI well treated with Tincture of Iodine, 5 drops in a tumbler of water daily.—H. W. Ridley, Jl. Trop. Med., Mar. 2, '25,103.

Sterilisation of the skin of operation areas.

The **Weak Tincture** (*B.P.* '14) is adequate, preferably made with 70% spirit (*vide infra*) but the 10% solution (Tinct. Iodi Fortis) in 90% Alcohol has often been used, it may however produce acute dermatitis. The method was advocated by Lionel Stretton—*vide* B.M.J. i./12,522, but it had its origin in pre-Listerian days. It no doubt increases leucocytosis in the area operated upon. The skin should be dry before applying.

Iodine Sterules are made in two forms :—

Form (1) encased in silk and absorbent wool. The "Sterule" is snapped and the Iodine Solution is absorbed by the surrounding material, which is then gently dabbed on to the part required.

Form (2). These are similarly encased, and contain a **Concentrated Solution**. One "Sterule" placed in a bottle or cup with 4½ ounces of Alcohol 70% or 3½ ounces of 'S.V.R.,' with 1 ounce of water (in urgency use simply a gill of neat brandy or whiskey), produces a supply of fresh 2% Iodine Solution for use on larger surfaces. The "Sterule" must be gently tapped to break it and well stirred round,—the glass fragments are retained by the wrapping.—*cf.*, A. G. Wildey, B.M.J. ii./12,437.

Whatmough's Patent Ampoules No. 23,437/1914 have a bulbous end encased in a pad of material. This end is broken by striking the ampoule padded end downwards on some hard surface. The pad is then rubbed over the surface before applying the first field dressing.

As application to abrasions, cuts, scratches, etc., **Weak Iodine Tincture** (*B.P.* '14) 2 parts, with Ether 3 parts, is used. Simple and time saving. Do not even cover the part afterwards if feasible.—B.M.J. ii./10,974.

When the Iodine Solution is used warm it has marked tendency to arrest capillary bleeding or oozing. As a lotion, add the strong solution to water until of light sherry colour, in septic cases make it darker.—B.M.J. ii./10,1004.

Instead of making a futile attempt to cleanse a wounded, work-soiled hand it is sufficient to paint the wound and surrounding tissues completely with the tincture. There is a little smarting, but it prevents inflammation or subsequent rigidity of the joints. Allow to dry before dressing with gauze, etc. It is wise to remove beforehand all comminuted bones and much mangled soft parts, but preserve even the smallest stump of thumb.—B.M.J.E. ii./10,77.

Rusty nail wounds and the like are well treated by packing the cavity with gauze soaked in Tincture of Iodine and allowing it to remain in for two or three days. If sutures are required, the skin along the edges should be painted to prevent stitch abscesses.—L. ii./11,238.

The Iodine produces hyperæmia which is the real agent in producing asepsis. The increased supply of blood is not only in the skin itself, but also in the subcutaneous tissue.—L. ii./11,442.

Tincture of Iodine made with 70% Alcohol sterilised non-spore bearing organisms in seven minutes whilst if of Official strength 10½ minutes; Sublimate Spirit (1 in 1,000), however, sterilised in 2½ minutes. Aqueous solution of Perchloride 1 in 1,000 never sterilised in under 30 minutes (!). Experiments on the skin were also conducted, amongst the conclusions being that Iodine—Alcohol (the Alcohol being 70%) is more potent than Alcohol alone, but the Sublimate Spirit is better. Neither guarantees absolute sterility.—B.M.J. ii./11,1078.

Sterilisation of the skin with a Petrol solution of Iodine—*B.P.* '14. Tincture strength—has been tried. It is cheaper than Spirit.

Experiences since the days of '**Bryant's Sherry.**'—B.M.J. i./13,12.

1% **in Benzene** satisfactory,—experience in the Balkan Wars.—L. i./14,76.

J. L. Stretton found no reason to alter composition of the solution. Preliminary washing and scrubbing unnecessary and positively harmful. Excellent in abdominal surgery. Coils of intestine, etc., may rest on the skin which has been sterilised with it. **Grossich's Solution** (10%) is far too strong. —B.M.J. i./15,886. See also ii./15,278.

In Naval Warfare—on the 'Tiger' was largely used.—B.M.J. ii./16,598.

Gas gangrene may possibly be prevented by local use, see Gas Gangrene.

Tetanus cannot be prevented by injecting Iodine—see Tetanus.

Its use is very irritating to most skins—may produce dermatitis, and the pain continues for some time after the dressing is applied. If due to *Hydriodic Acid* prevent this by adding a small amount of Iodic Acid. Good Deodorant. Spirit solutions act like hypertonic salines by inducing serous flow.—Casualty Clearing Station criticism.—A. Don, B.M.J. i./16,648.

SMALLPOX and CHICKEN POX.—Iodine applied prevents pitting and aerial dissemination.

Iodine in Liquid Paraffin. *Martindale.*

During the war we made experiments to produce a preparation of Iodine in Liquid Paraffin as a first-aid dressing to wounds. We determined that a Saturated Solution in Liquid Paraffin, Sp. Gr. 0·875 made in the cold is approximately 1% strength—the solution appeared to be quite stable (as compared with a corresponding Bromine Solution which we also made). It should be diluted 10 or 100 times. It was used in the treatment of trench-foot.

To replace the Tincture of Iodine. Suggestion to dissolve Iodine in Liquid Paraffin and then emulsify. The chemical reactivity would be damped and there would be less interference with the simple form of its physiological action.—B.M.J. i./25,421.

Bromine in Liquid Paraffin.—A plain solution is out of the question—interaction occurs with either strong or dilute solutions—the solubility is in the neighbourhood of 1 in 25—single link compounds, of which the bulk of Russian Liquid Paraffin is composed, as is well known, would substitute Br thereby liberating HBr). Further work is suggested with this reaction product. It could be washed free from acid. *cf.* p. 53 and Paraffinum Liquidum.

ORGANIC IODINE COMPOUNDS.

Iodinol.—*Martindale.*

Dose.—30 to 45 grains *per os* of the 25%=about 10 to 15 grains of Potassium Iodide. **Capsules** contain 30 grains (2 Gm.). Hypodermically 30 to 90 minims (2 to 6 Cc.) of the 25% preparation. (Commence with the same dose of the 10% compound.)

Sterules, Hypodermic, contain 30 (2 Cc.) and 60 minims (4 Cc.).

For treatment of tertiary syphilis larger doses slightly warmed have been given on alternate days hypodermically.

An additive compound of Iodine and Sesame Oil, in strength of 10 and 25% of Iodine, prepared by repeated iodising of Sesame Oil by means of Iodine-Monochloride. The preparation is a thick brown oil. The 25% has Sp. Gr. 1·23, and the 10% 1·025. It permits of lengthy and continuous administration of Iodine. Either the 10% or 25% preparation may be used by inunction.

Soluble in ether and in chloroform, insoluble in alcohol.

Uses.—Scrofulosis, convulsions of children, tuberculous infections, *e.g.* of the larynx, pleuritic induration, facial paralysis, arteriosclerosis, gout, bronchial troubles, actinomycosis, and syphilis have been well treated by internal and local use—in many affections either inunction or hypodermic injection can be employed. Uterine fibroids have been treated by injections. It has been found useful instilled for eye affections.

Taken *per os* it is thought to pass through the stomach into the duodenum,—here it is acted on by the bile and pancreatic secretions and is emulsified. The greater part of the iodised fat is stored in the tissues, *e.g.*, marrow, liver, etc.

Asthmatic affections are relieved by an Iodinol capsule quickly without causing headache.—Canny Ryall.

Rheumatoid arthritis relieved by hypodermic injection of a 1 in 40 solution of iodine in sesame oil—¼ grain per week.—R. Kerry, B.M.J. i./26,976.

See also **Injectio Guaiacol Iodi et Camphoræ** (Watson Smith).

In diagnosis, Iodipin has been used by injection, but given up in favour of Bromipin which is more fluid. Warning against use in active tuberculosis of the lungs. Severe focal and general reactions may be produced.—G. Schröder, L. ii./26,1135.

It has also been used in pyelography.

Iodinol may be given in beer, wine, milk, shaken with syrup or emulsified as **Emulsio Iodinol**:—Iodinol 25% 2 ounces, Gum Acacia 1 ounce, Chloroform 12 minims, rub together and add quickly with vigorous agitation Water *q.s.* to 6 ounces. Dose of 2 drachms ≒ about 12 grains potassium iodide.

Iodinol Tablets contain 3 grains of the 25% preparation, *i.e.*, ¾ grain Iodine = 1 grain Potassium Iodide. *Dose.*—Up to 90 grains (30 tablets) per diem.

Iodinol cum Extracto Malti. *Dose.*—1 ounce (**30 Cc.**).

Iodinol 25% 1, Malt Extract (thick) to 4. A palatable method of administration.

(✱ **Iocatol** (T.M. 364270) is similar, made in 10, 20, and 25% strength.)

✱Lipiodol (T.M. 457303).

A compound of Iodine and Poppyseed Oil containing 40% by weight of Iodine or 0·54 Gm. in 1 Cc.

It is apparently produced by the addition of Hydriodic Acid to the oil.

Dose.—1 to 20 Cc. intramuscularly can be given, it is stated, at one injection to a total of 100 to 200 Cc. if necessary, *but we advise caution.* For internal use 6 minim capsules are made. This is equivalent, on Iodine content, to about 4 grains of Potassium Iodide, but is stated to be therapeutically equivalent, owing to show elimination, to 15 grains of Potassium Iodide.

Uses.—A substitute for the alkali iodides. Employed intramuscularly in asthma, syphilis and rheumatic affections.

In conjunction with X-Rays used in the diagnosis of bronchiectasis and a variety of diagnostic procedures (*v. postea*).

Local injections of Lipiodol have good analgesic effect in sciatica, lumbago and arthritis.—J. Forestier, Am. Jl. Rœntgen. Apl. '26,352. Per Pres., June '26,255.

BRONCHO-SPIROCHÆTOSIS. A peculiar form of bronchitis with *Sp. bronchialis*, as described by Castellani in 1905, as causal agent.

The Tartar Emetic mixtures of Castellani *q.v.* are advised.

Sub-acute and chronic cases have been treated with Lipiodol. A course of 3 to 6 injections of 2 Cc. intramuscularly. No symptoms of iodism appear. At the end of course spirochetes practically disappear and there is scarcely any sputum. One series of injections usually sufficient, but as a precautionary measure may be repeated 2 weeks later or Iodotannic Syrup administered 3 times daily for 15 days, followed by 2nd, 3rd and 4th course with one week's interval between each. Practically all the writer's patients recovered under this treatment.—Najib Farah, Jl. Trop. Med., April 2/23,103.

Diagnostic Methods.

THE BRAIN.—X-Ray photographs showing the ventricles of the brain have been obtained after the injection of low density Lipiodol by lumbar puncture. The suggested possibilities in the localisation of tumours, and the contact with the brain of the Iodised Oil may have therapeutic application in cerebral syphilis.—L. ii./25,1081.

BRONCHIECTASIS.—Bronchiectatic dilatations can apparently be diagnosed and localised with certainty by the aid of Lipiodol injections, giving dose of 15 to 20 Cc.—in many cases, it is the only method of proving diagnosis. It permits distinction between bronchiectasis from lung abscess, from empyema with a broncho-pleural fistula, and from tuberculosis. With regard to lung abscess and empyema with a pleural fistula the help is negative. Lipiodol does not appear to enter the pulmonary abscess, but stops short of it, nor does it easily flow through the bronchial fistula into an empyema cavity. Tuberculous cavities fill readily but injections may be undesirable in this instance. Injections are made through the crico-thyroid membrane—first a few minims of 2% Novocain intradermically and then 0·5 Cc. of 5% Cocaine Hydrochloride solution into the trachea in advance.—F. G. Chandler and J. M. Young, B.M.J., i./27,230.

Intratracheal injection of the oil to show up lesions of the bronchi and bronchioles. Tracheal deviation, dilatation of the bronchi, bronchial cavitation and bronchial and pleural fistulæ can be diagnosed with a degree of certainty.—E. Sergent, B.M.J., ii./26,691.

Treatment and diagnosis. Lipiodol 20 Cc. injected through the crico-thyroid membrane after anæsthesia with 5% Cocaine. Shadow visible in some cases as long as 4 months after introduction.—Clive Riviere, L. ii./26, 1102. See also Leuret & Secousse.—B.M.J.E., i./25,80.

In the diagnosis of bronchiectasis.—L. S. T. Burrell and S. Melville, L. ii./25, 278.

Iodism does not occur unless the preparation is coughed up and swallowed.—J. E. H. Roberts, L. ii./26,1106.

It is not known whether the compound will give a characteristic picture in the early stages.—F. G. Chandler, L. ii./26,1114.

Dangers of Iodised Oil Intratracheally are definite.—Archibald and Brown, per P.J. ii./27,177.

A generalised Iodide eruption with fatal termination followed the intratracheal injection of 20 Cc. Lipiodol.—W. J. O'Donovan, B.M.J. ii./27,935.

THE FALLOPIAN TUBES.—Visualisation of fallopian tubes by injection of Iodised Oil.—Per Jl. A.M.A., ii./25,1261.

THE LACHRYMAL PASSAGES.—The value of the oil in examination of.—J. Bollack, Ann. d'ocul., '24,161,321. Per Pres., Feb. '26,63.

THE LUNGS.—Of value in radiography of the lungs. Should not be used in persons susceptible to Iodine—case of acute Iodism reported.—Clerf, B.M.J.E., i./26,35.

Successful in skiagraphic studies of the respiratory tract, nervous system, subphrenic abscess and pericarditis with effusion. Has definite therapeutic value when injected into a purulent pericarditis or an empyema.—Castex and Co-workers, B.M.J.E., i./26,65.

PREGNANCY.—Indicated by radiograph after injection of Lipiodol into uterus—no danger of abortion.—C. Heuser, L. ii./25,1111.

SPINAL LESIONS.—Radiographic localisation of spinal lesions by Sicard's Method.—Percy Sargent, B.M.J. ii./23,174.

In selected cases, an aid in the study of spinal cord compression and increases successful removal of tumours at earlier stage in course of disease, but should not usurp place of careful and repeated clinical examinations, should only be used after subarachnoid block has been demonstrated, and then only if possible dangers and complications (increased pain at site of lesion, general soreness of back muscles, headache, rise in temperature, sleeplessness and restlessness) are outweighed by more exact localisation likely to be obtained. —D. Armour, L. i./27,430.

THE URETHRA.—Urethral injection of Lipiodol for diagnosis.—Kohnstam and Cave, B.M.J., ii./25,908.

Iodipin *has been used on similar lines, see under Iodinol.*

Iodoprotein, *Martindale.—Dose.*—10 to 15 grains (0·6 to 1 Gm.) increased if desired.

A brown powder containing about 10% of Iodine.

Solubility.—The compound is insoluble in water and dilute Hydrochloric Acid; soluble, however, in dilute alkali, hence is thought to be absorbed in the intestines, and does not derange the stomach.

Uses.—In syphilis, arteriosclerosis, gout, rheumatism, exophthalmic goitre, asthma and in all cases where Iodides are administered beneficially, *e.g.*, scrofula, enlarged glands (orchitis).

Iodoprotein Tablets 5 and 10 grains (=½ and 1 grain of Iodine).

GOITRE.—Found most efficacious—swelling reduced and general health improved.—L. Evans.

A dose of Potassium Iodide containing Iodine 191 mgr. and a dose of Iodised Protein containing Iodine 188 mgr. were administered. The whole of the Iodine from both doses was excreted at the end of 48 hours, but the rate of excretion was different. At the sixth hour 37·7% Iodine was excreted in the case of Iodised Protein, as against 51·4% in the case of Potassium Iodide. In the same way the heavier salts of the halogens, such as Iodide and Bromide of Strontium yield up their Iodine and Bromine to the system at a slower rate than the correlated salts of Ammonium, Sodium and Calcium. Excretion may be rightly regarded as the measure of absorption, so that comparatively insoluble forms of drugs, *i.e.*, those of slower disintegration, are more likely to exert a longer continued activity.—Pres. Nov. 1911, p. 279.

Iodo-Casein.—*Dose.*—10 to 15 grains (**0·6 to 1 Gm.**).

A yellowish brown powder containing 15% Iodine. As an Inorganic Iodine Substitute. Insoluble in Acid, and partially dissolved in alkaline solutions.

Iohydrin—*Martindale.* **Di-iodo-isopropylalcohol, Glycerin Di-iodo-Hydrin.**

$CH_2I.\ CHOH.\ CH_2I = 311{\cdot}912$

Dose.—By inunction, ½ to 1 drachm weight suitably diluted in 25% or less Ointment. *Caution.—Is not given internally.*

A yellowish oily liquid (Sp Gr. 2·5) prepared by heating *s*-dichlorhydrin with potassium iodide solution. Contains about 80% iodine

Incompatible with water.

Soluble 1 in 75 of water. Being readily absorbed by the skin is employed for inunction of iodine in inflammatory conditions, scrofula, pulmonary tuberculosis, bronchial asthma, &c.

Unguentum Iohydrin 25% or less as ordered in Lanolin basis is the most suitable strength. It should not be applied to any delicate portion of the body—pure Iohydrin alone is caustic

Calcii Iodobehenas U.S. X. $(C_{22}H_{42}O_2I)_2Ca = 970{\cdot}606$. SAJODIN A tasteless powder containing about 23% Iodine and 4% Calcium. ***Insoluble*** in water: used in syphilis, bronchial asthma, arteriosclerosis, &c.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**) up to 90 grains per diem *after* meals.

Ferro-Sajodin Tablets.—7½ grains = 0·12 Gm. Iodine and 0·028 Gm. Fe. *Dose.*—One tablet two or three times a day after meals.

Assumed to be Iron-Iodobehenate. Contains 24·5% Iodine and 5·6% Iron. Substitute for Inorganic Iodine and Iron. In syphilis, anæmia, etc.

Di-iodo Elaidic Acids containing 45 to 47% Iodine are more suitable for use. Tasteless compounds insoluble in the acid secretion, but decomposed in the intestines.—P.J. i /11,175

Sabromin. *Syn.* **Calcium Dibromobehenate** $(C_{22}H_{41}Br_2O_2)_2Ca$ = 1034·390.

Dose.—15 to 45 grains (**1 to 3 Gm.**) in powder or tablets (7½ grains). Contains 29% approx. Bromine. White powder insoluble in water and alcohol. An alkaline Bromide substitute stated to have less tendency to produce bromism, the absorption being slow. Used in epilepsy.

✱Iodostarin (T.M. 318223). *Syn.* Di-Iodo-Taririnic Acid. $CH_3(CH_2)_{10}CI.CI(CH_2)_4COOH$ = 534·12.

Dose.—Tablets containing 3 grains—1 to 3 *per diem.*

Taririnic Acid occurs as its glyceride in the oil of the fruits of Picramia Sow or Tariri—a *Simaruba* found in Guatamala. Leaflets melting point 50·5° C. The formula given by Schmidt is $C_{18}H_{32}O_4$ not $C_{18}H_{24}O_2$ which the above compound would indicate.

Iodostarin contains 47·5% Iodine. It is a tasteless compound from which the Iodine is probably absorbed in passing through the intestine and hence as a succedaneum to the alkaline iodides, is used in syphilis, actinomycosis and arteriosclerosis. Consumption of Alcohol simultaneously is to be restricted, as iodism may result.

✱Lipoiodine-Ciba (T.M. 352122).—The Ethyl Ester of Di-Iodobrassidic Acid, containing over 40% of Iodine. Tablets contain 0·3 Gm. To be taken subsequently to the chief meals, masticating thoroughly.

For a comparison of the amount of Iodine in Organic Iodine Compounds with that in Potassium Iodide, vide Vol. II.

For a résumé of a number of these preparations and for formulæ for Egg Combinations of Iodine see G. Sharp, P.J. ii./13,99,100.

IPECACUANHA.

(*In numerous Pharmacopœias.*)

Dose.—As an expectorant, ½ to 2 grains (**0·03 to 0·12 Gm.**), as an emetic 15 to 30 grains (**1 to 2 Gm.**).

The dried root of *Psychotria Ipecacuanha* (*Rubiaceæ*)* from **Rio De Janeiro.** A second variety is the Minas Ipecacuanha from Brazil. A third is Indian from the same plant, grown in Straits Settlements; another variety is known in commerce as **Carthagena Ipecacuanha.** It is thicker, the annulations less marked (taking the form of narrow merging ridges) and its starch-grains are somewhat larger; this is less expensive, and is not official.

Flavoring of Liquid Ipecacuanha Preparations. —Syl Vanillæ, Syl Rosæ; Syrupus Aurantii.

Uses.—Expectorant, emetic. If taken in sufficiently large doses it is not its own antidote. Loosens phlegm, *e.g.*, in bronchitis, whooping cough and croup. In small doses is stomachic and increases the flow of bile. The alkaloid Emetine contained in it has been found to be virtually a specific for amœbic dysentery. Frequent doses, 1 to 2 minims of the Wine of Ipecacuanha sometimes check sickness.

For tropical liver abscess Ipecacuanha is specific. It cures the active or latent dysentery which has caused the suppurative hepatitis and prevents further breaking down of the liver substance. Large doses better than several small ones. Vomiting may be prevented by Chloral Hydrate and Liquor Morphinæ.

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* F.I. uses the name *Uragoga Ipecacuanha.*—Baill —P.G. VI. has this.

Dysentery and Hepatitis, Treatment.—The patient should not eat or drink anything for two hours before and after the dose, but twenty minutes previously he should take 20 grains of Chloral. The dose of Ipecacuanha is 30 *grains for the first three or four nights*, reduced to 25 and 20 gradually, a single dose daily being usually sufficient. When the leucocytosis has fallen to 10,000 or less, the temperature has become normal, and the discomfort in the region of the liver has disappeared, the drug may be continued for another week in doses of 20 grains daily. All patients who have had such an attack should abstain from alcohol so long as they reside in India. As a rule diffuse hepatitis precedes the formation of a liver abscess. In hospital practice, in which Ipecacuanha was systematically used, not a single case of dysentery was complicated by hepatitis.—B.M.J. ii./10,2039.

Diarrhœa in the French Army well treated by 0·8 to 1 Gm. of the powdered root, *p.d.*, divided into 5 or 6 doses of 0·2 Gm. Each dose is taken in a warm infusion every two hours. On the day of administration the patient is restricted to a liquid diet and milk is forbidden. The following day he may feed on solids again, with the exception of meat. The diarrhœa is not stopped on the actual day of administration, but ceases on the following day. Patient is not rendered unfit for duty for more than a day. The remedy is well tolerated; it sometimes gives rise to nausea, but rarely to vomiting.—Lehmann, L. ii./15,363.

B.P. '14 requires not less than 2% Alkaloids. *For the methods of assay of Ipecacuanha and other chemical data see Vol. II.*

F.I. agreed the root bark only to be powdered, rejecting the woody portion. The powder should have an alkaloidal strength of 2%. Fr. Cx. also requires 2% alkaloids and directs it to be estimated for alkaloid on a sample powdered as directed under Poudre d'Ipecacuanha; powdering in a covered iron mortar and passing through a fine sieve to the extent of three-quarters of the weight of root taken.—*i.e.*, rejecting the woody portion.

U.S. allows both *Cephaelis Ipecacuanha* (*Rio*) and *C. acuminata* (*Carthagena*) if yielding 1·75% Ether soluble alkaloids.

Ⓟ**Tablets of Ipecacuanha Powder** contain $\frac{1}{20}$, $\frac{1}{10}$, $\frac{1}{4}$ and 5 grains. Ⓟ**Pills** have been prepared salol-coated with a view to their dissolving in the intestine only. '**Stearettes**' *q.v.* are preferable.

Ⓟ *'**Membroids**' (T.M. 272337) (Animal Membrane Capsules for dissolving in the intestines) of Ipecacuanha, 5 and 10 grains are useful in the treatment of dysentery.

Membroids are also made of Blaud Pill = 1, 2, and 3 Pills, and P1 with arsenic $\frac{1}{50}$ and $\frac{1}{100}$ grain, of creosote, 1, 2, 3 and 5 minims, and of quinine sulphate 1, 2, and 3 grains, and of santal oil 5, and 10 minims, also santal oil 8 minims, salol 2 grains and methylene blue 1 grain.

Ⓟ**Extractum Ipecacuanhæ Liquidum,** *B.P.* '14.
Dose.—$\frac{1}{2}$ to 2 minims (**0·03 to 0·12 Cc.**).
Made by extraction with 90% Alcohol and Standardised to 2% Alkaloids.

Ⓟ**Fluidextractum Ipecacuanhæ, U.S. X.** 1 = 1 by hydro-alcoholic percolation. Standardised to 1·5 Gm. Alkaloids in 100 Cc. *Average dose.*—Emetic, 15 minims; expectorant, 1 minim. P. Helv. has Liquid Extract containing 'at least 2% Emetine and Cephaeline.'

Ⓟ**Extractum Ipecacuanhæ,** Fr. Cx.—Extract the root with 70% Alcohol, and evaporate to firm extract.

Ⓟ**An Elixir** has been made with Liquid Extract 1, Alcohol 90% 1, Glycerin 5, Water to 20; may be dispensed with alkalis. *Dose.*—As expectorant, 10 to 30 minims.

P1 **Pulvis Ipecacuanhæ Compositus.** (Exempted from B.)
Syn. DOVER'S POWDER (*B.P.* '14).
Dose.—5 to 15 grains (0·3 to 1 Gm.).

Ipecacuanha 1, Opium 1, Potassium Sulphate 8. Is diaphoretic and anodyne; 10 grains at bedtime for an acute catarrh or coryza, followed at once by a hot drink and 5 grains of quinine next morning.—Tilley.

B P1 **Poudre d'ipecacuanha opiacée.**—FR. CX. *Max. single dose* 15 grains Max during 24 hours 60 grains. Is the same but has Potassium Nitrate 4 and Potassium Sulphate 4, *vice* Potassium Sulphate 8.

P1 **Tablets of Dover's Powder, 5 grains (0·3 Gm.).**

Note.—**Dover's Powder** is named in Ph. Ned. V. Pulvis Opii Compositus, see p. 630.

F.I. Second wanted the name **Pulv. Opii et Ipecac Co.** for the preparation containing Ipecacuanha.

Aspirin with Dover's Powder, see p. 76.

Ⓟ **Syrupus Ipecacuanhæ, P.G. VI; (F.I.)**
Ipecacuanha Tincture 1, Syrup 9.

FR. CX. has 'Sirop' 1% of Extract made by dissolving Extract 1 in Alcohol 70% 3, and mixing with Syrup 100; intended as an emetic. That of F. I. is not emetic in usual doses.—FR. CX.

Ⓟ **Tinctura Ipecacuanhæ.**—FR. CX.; P.G. VI. (standardised to at least 0·194% Emetine = $C_{30}H_{44}O_4N_2$), **P. Belg.; P. Hung.**—10% of root by percolation with Alcohol 70%—as required by F.I

Ⓟ **Trochisci Ipecacuanhæ.**—$\frac{1}{4}$ grain (0·015 Gm.) in each, with Simple basis (*B.P.* '14) or Fruit basis (B.P. '98).

Ⓟ **Trochisci Morphinæ et Emetin** (TROCHISCI TUSSIS) contain Morphine $\frac{1}{40}$ grain with Emetin $\frac{1}{80}$ grain. In bronchial asthma.

Ⓟ **Unguentum Ipecacuanhæ et Crotonis.**—Sawyer.

Pulvis Ipecacuanhæ 1, Linimentum Crotonis 1, Adeps Benzoatus 2. A powerful counter-irritant, rubbed on the skin of epigastrium relieves gastralgia.

Ⓟ **Vinum Ipecacuanhæ** (*B.P.* '14).
Dose.—As an expectorant, 10 to 30 minims (0·6 to 2 Cc.); as an emetic 4 to 6 drachms (15 to 22 Cc.).

B.P. 14 uses Liquid Extract of Ipecacuanha 1 to Sherry 19. It is better, however, to prepare with detannated wine. Is given in 2 to 3 minim doses to allay the vomiting in pregnancy.

P1 **Emetina.** *Syn.* IPECINE.—$C_{29}H_{40}N_2O_4$ = 480·336.

Emetine was discovered by Pelletier, 1817. Further details—B.M.J.i./21,59.

The formula of Carr and Pyman as above stated was confirmed by Karrer (1916), who also claims to have discovered independently the formation of Emetine by the methylation of Cephaëline.—C.D. Apl. 28/17.

A new constitutional formula for Emetine.—W. H. Brindley and F. L. Pyman, J.C.S., '27,1067.

In the stable neutral salts the bases are combined with *two* equivalents of Acid. Basic Salts also exist. Both this alkaloid and Cephaëline are lævo-rotatory.

A white powder darkening on exposure. *Soluble* in water 1 in 600 at 15·5° C., 1 in 900 at 40° C.—by our expts., January 1924. Soluble also in ether, alcohol, and chloroform.

P 1 **Emetine Hydrochloride** P. Jap. IV.; Fr. Cx. Supp. II., P.G. VI. $C_{29}H_{40}N_2O_4 2HCl,6H_2O$=661·362. Ph. Ned. V. has varying quantity of water.

Dose.—$\frac{1}{100}$ to $\frac{1}{25}$ grain (**0·0006 to 0·0025 Gm.**) *per os* as an expectorant—a crystalline salt. As an emetic *per os* $\frac{1}{12}$ to $\frac{1}{6}$ grain (**0·005 to 0·01 Gm.**) has been given. ***Hypodermically*** in amœbic dysentery and hepatitis ½ to ⅔ grain. Rogers gives 1 grain of Emetine each day—in *two hypodermic doses* of ½ grain each. *Amœbæ* in the body thought to be killed *in from two to four days.*—Sir C. P. Lukis, B.M.J. i./13,1357.

Fr. Cx. Supp. II. has maximum dose 0.1 Gm. per dose and per diem. P. Jap. 0·05 and 0·15 Gm. respectively.

Heating to 120° or even 140° C. apparently does not decompose it except for loss of water of crystallisation.

Cumulative Action.—Poisoning may result. Bad effects on kidneys and liver. Experiments made on cats hypodermically seem to show that 1½ grains per day for man should not be exceeded.—H. H. Dale, B.M.J. ii./15,895.

Emetine Hydrochloride 0·12 Gm. intravenously or 1·8 Gm. hypodermically would probably be toxic to a man of 60 kilos. The maximum safe dose for man would be 0·06 Gm. intravenously or 1·2 Gm. subcutaneously. A total dose of Emetine hypodermically even if spread over several weeks is the limit of safety.—Dalimier, Presse Méd. per P.J. i. 17,319.

Intramuscular injection of Emetine found satisfactory. No pain or swelling.—P. Figdor, L. ii./17,258.

Intravenously ½ grain to ⅔ grain in 5 Cc. Normal Saline has been given—the best plan in desperate cases.—L. Rogers, Jl. Trop. Med. March 1, 1913, p. 74.

Soluble about 1 in 9 in water, but this is not permanent at 15·5° C.—it is safer to use 20 parts of water at least. Our experiments showed that the addition of a little Hydrochloric Acid throws out a precipitate. The acid salt is known to be less slouble.

D. B. Dott confirms this solubility. The 1 in 9 Solution soon becomes cloudy from the formation of crystals. It required three more parts of water to render the salt completely soluble—the solubility cannot be stated until there has been ample time for the salt fully to crystallise.—P.J. ii./17,283.

Injections made with Distilled Water are less irritant than those made with Normal Saline. Solutions in ampoules stand sterilising.—Y.B.P., 1919, p. 12

Pharmacology of Emetine.—It depresses and may eventually paralyse the heart. It is a powerful gastro-intestinal irritant whether given *per os* or hypodermically. May be source of danger in pathogenic condition.—E. J. Pellini and G. B. Wallace. American Journal of Medical Science, Journal of American Med. Assn., 1916, *67*, 975 per P.J. ii./16,413.

Uses.—The standard treatment for amœbic dysentery (see also Emetine Periodide and Auremetine). It has also been successfully used in bilharziasis, cholera, Guinea worm, and Oriental sore (see pp. 529 for references). Morphine habit (*q.v.*) has been treated.

DYSENTERY, TREATMENT OF, BY EMETINE INJECTION.

When amœbæ are taken fresh and vigorous from dysenteric ulcers in the bowel, Emetine and Cephaeline have surprisingly weak action on them. Vigorous amœbæ can be kept crawling about for 2 hours in a 1% Emetine Hydrochloride solution. DIMETHOXY-EMETINE found to be 10 times as poisonous for the amœbæ and not nearly as poisonous for the *animal* as Emetine, but it has no therapeutic effect. The curative value of these alkaloids is proportional not to their action directly on the amœbæ but to their poisonous action on the *patient.* The body of the patient must play an important part and perhaps *primary* part in killing the parasite. The nature of such co-operation between remedy and living tissue is difficult to unravel. —Dale and Dobell, B.M.J. i./22,807. Prof. Dixon also made the statement (B.M.J. ii./22,410) that '*Emetine does not kill the amœbæ except in the human body,*' but this does not appear entirely in accord with Dobell and Laidlaw (Parasitology, June '26, L. ii./26,762), in which the conclusion is drawn that the alkaloid kills *E. histolytica* by ***direct action.*** They conclude further that 1 in 50,000 is the highest concentration of Emetine that *E. histolytica* will tolerate for more than a short time—this is the threshold value of Emetine. Cephaeline is definitely more toxic than Emetine for *E. histolytica.* Emetine is 10 times more toxic than Stovarsol. The poisoning process of Emetine is slow. *A very small amount constantly present in the intestine for days or weeks would probably suffice to make life for E. histolytica (though not E. coli) impossible*

The Italian view is that streptococci are the active agent rather than amœbæ.—R. Larkin, B.M.J. i./22,901.

Sir Leonard Rogers found that *hypodermic* injections of this salt were most effectual in dysentery. ⅙ grain (= about 15 grains of Ipecacuanha) given as a trial in first case,—acute hæmorrhagic amœbic dysentery—with good result. Subsequently two doses of ⅓ grain completely cured *without producing nausea or vomiting.* Two other cases—one chronic amœbic dysentery of 3½ years' standing and the other acute hepatitis, both cured similarly. In the latter case several ½ grain doses were given. Temperature was promptly reduced. In all cases the giving of Ipecacuanha *per os* was impracticable.—B.M.J. i./12, 1424.

J. A. Tull Walsh states he used Emetine in dysentery with good results prior to Rogers.—See I.M.G., Sept., 1891; L. ii./12,1179.

In Calcutta and in Bombay, in the damper parts of India, the amœbic variety of dysentery is the more prevalent. In children about seven ⅓ grain doses given successfully.—L. ii./12,1064.

HEPATO-BRONCHIAL FISTULA of five months' duration was cured by six hypodermic injections of 2/3 grain in 5 days.—B.M.J. i./13,574; L./13,1132, 1546.

Amœbic dysentery of 3½ years duration cured. Patient had been passing 20 to 30 stools a day. Specific in 36 hours.—L. i./13,1803.

Amœbic dysentery in Egypt treated by ⅛ to 1 grain hypodermically—majority received this amount thrice per week. Hæmorrhage ceased and pallor disappeared. One case of 4 years standing cured with 3 injections. —E. J. Harpur and W. B. Waddad, L. i./15,255.

Sir R. Ross on the treatment of dysentery. Past experience in India. Ipecacuanha given in massive doses. The first dose usually vomited but the drug tolerated on the second or third. Up to the present, the author states, he is not at all convinced that the drug is of no benefit in *bacillary* dysentery, also. In chronic dysentery the drug was given daily for some weeks. Enemata were used more certainly than in acute dysentery and Nitrate of Silver was a classical drug for the purpose. In amœbic dysentery amœbæ may remain almost innocuous for a time but all amœbæ and flagellates are potentially dangerous. Experience among the troops—British, Colonial and Indian—showed that dysentery was not so prevalent among the latter, showing that a certain amount of immunity is no doubt acquired during childhood. One grain of Emetine Hydrochloride was given as a general rule either in one subcutaneous injection or in two doses morning and evening, then given three days consecutively with the same period intermitted or 5 days on and 5 days off. One week's treatment generally efficacious. A single lethal dose for man, Rogers calculated, is 15 grains. As to the medicinal treatment of running acute dysentery, heaped teaspoonsful of Bismuth Subnitrate are advised 3 or 4 times a day (Deeks treatment in Panama). Tannic Acid 10 grains is a useful addition. To prevent hepatic abscesses which continue to appear for years after attacks, continue Emetine periodically.—L. i./16,1.

In some cases there was subsequent palpitation, breathlessness, arrhythmia and precordial pain. It was a question as to whether these effects were due to the acute infection, excessive smoking or the remedy Emetine (experimentally Emetine has been found to produce ventricular fibrillation.—Levy and Rowntree).—Surg.-General H. D. Rolleston, B.M.J. i./17,225; L. i./17,258.

When Emetine fails in dysentery, Decoction of *Simaruba Officinalis* in doses of 6 Gm. in 200 Cc. of water, a Wine made of seeds of *Brucea Sumatrana* or a Decoction of *Ailanthus glandulosa* recommended. *Locally* injections of Thymol 1 in 6000, Silver Nitrate 1 in 1000, Quinine 1 in 1000 advised. Copper Sulphate 1 in 2000, Tannin 1 in 500, Potassium Permanganate 1 in 4000 have also been tried but are of no effect.—Prof. V. Gabbi, L. i./16,523.

Peculiar effects may be produced. In two fatal cases there was inability to swallow after food had reached the œsophagus; hepatisation of the lungs and action on the heart.—Military Surgeon (American) 1917, *40*, 58.—Per P.J. i./17,139.

In acute dysentery irrigation of the large bowel with 0·5% Tannic Acid Solution often better than Emetine. As enema in conjunction with Emetine treatment also useful. Tannin 4, Iodoform 3, Sodium Chloride 6, Arrowroot 25, water to 1000. To be given in two enemata in 24 hours. Must be kept in the large intestine for 15 to 20 minutes.—Prof. S. Kartulis, B.M.J. i./16,144.

It is said there are ***nearly 2 million cyst-passers in England***, and the question is often asked why the entamœba should cause dysentery amongst infected persons in the Tropics but not among those in temperate zones.—Per L. ii./26,762.

A case of amœbic dysentery contracted in England cleared up under courses of Emetine Hydrochloride 1/3 grain hypodermically.—M. N. Russell, L. i./26, 229.

Emetine does not kill the Cystic Stage of the Parasite.—It kills the amœbæ or active living forms which are present in the tissues of the bowel. The cysts in the fæces are being cast off and only indicate that there are living amœbæ in the bowel producing them. If all the amœbæ are killed, then there can be no further production of cysts; the stools become negative and remain so permanently.—G. C. Low, L. i./17,482.

The Relative Failure of Hypodermic Treatment with Emetine with dysentery carriers is probably to be explained by the entamœbæ being more or less shut off from the circulation and tissue fluids of the patient.

Small quantities (less than 10 grains in total) given hypodermically rarely rid a carrier of E. Histolytica of his infection.

Full courses of the drug (10—12 grains or more) are successful in about one third only of the cases treated.

Re-treatment with equal or larger amounts of the drug—of patients who have already received full courses, offers little hope of success.—Clifford Dobell in Special Report on Dysentery issued by Med. Res. Com. under Nat. Health Ins. (H.M. Stationery Office), 1917.

An individual who is in the carrier condition may at any time revert to one of acute amœbic dysentery. An infected person frequently suffers from periodic attacks of acute amœbic dysentery when only the large tissue-invading forms of E. histolytica are present in the stool. Between the attacks, when the acute symptoms have abated, the carrier condition maintains.—C. M. Wenyon, Protozoology, Vol. I., p. 190.

In Salonika forces Emetine in acute dysentery was of greatest use in controlling acute manifestations of the infection but disappointing when used for eradicating the parasites from the system.—Col. A. G. Phear, Proc. Roy. Soc. Med., 1920, Vol. XIII., pp. 57-100.

Emetine Injections in conjunction with Bismuth per os (James & Deeks).

Bismuth Subnitrate and Emetine Hydrochloride combined cure many cases. Emetine alone seldom cures. Give Emetine Hydrochloride hypodermically, ½ to 3 grains, to the limit of tolerance, then Bismuth Subnitrate, a ***heaped teaspoonful (180 grains)*** in a tumbler of water every 3 hours night and day in severe cases (in chronic cases continue for 2 or 3 months after convalescence with 3 or 4 doses daily). Etiology, symptomatology and treatment of intestinal amœbiasis.—W. M. James and W. E. Deeks, Int. Conf. Trop. Am., '24,271—308.

See also the experiences of Willmore and Martindale in England, p. 537. Results gratifying even in most chronic cases.—U.F.C., '25,116.

Arsenicals first and Emetine after, unsuited in the acute amœbiasis found in the Tropics—Emetine should be given first. In cases resistant to Emetine large doses of Bismuth Subnitrate effective: an important advance.—Sir L. Rogers, Int. Conf. Trop. Am., '24,316.

Possibility of toxic symptoms from the Bismuth attacking the ulcerated intestine. Small intramuscular injections of Bismuth suggested as more useful, in addition to Emetine.—A. R. Paterson, Int. Conf. Trop. Am., '24,329.

Neuritis of nerves of the arm due to excessive ingestion of Bismuth—½-lb. a month. Cured by Sodium Iodide intravenously.—A. A. Facio, Int. Conf. Trop. Am., '24,331.

Liver Abscess has been treated by 1½ grains hypodermically daily after successful surgical evacuation.—C.B. Pasley, L. i./15,1076. It may be necessary to repeat the treatment periodically.

Amœbic liver abscess is produced by infection through the portal vein with *E. histolytica*, only very occasionally assisted by bacteria, and is always secondary to antecedent amœbic ulceration of the large bowel, which is clinically active and acute in the multiple variety, but usually completely latent clinically in the more chronic single variety, while such abscesses never occur in relation to bacillary dysentery.—Sir L. Rogers, L. i./22,463,569,677. See also B.M.J. i./22,224,264,345.

The prevention and treatment of amœbic hepatitis and liver abscess.—Sir L. Rogers, Int. Conf. Trop. Am., '24,346-356.

Emetine is more efficacious in amœbic lesions of the liver in extirpating *entamœba histolytica* than when the parasite invades the bowel wall. Cases recorded show that Emetine should be used only as an adjuvant to surgical measures, *e.g.*, aspiration.—P. Manson-Bahr and R. M. Morris, L. i./26,69.

This does not agree with previous statements—see *ibid.* 156.

Emetine alone is sufficient to cure cases of liver abscess. Pain and inconvenience of aspiration undesirable.—V. S. Hodson, L. i./26,681. Manson-Bahr's reply *ibid.*

Aspiration *plus* Emetine cures hepatic abscess in the most certain way possible. After an injection of Cocaine, removal of pus relieves the patient. —E. Owen Thurston, L. i./26,784.

Diagnosis:

For Method of Searching Stools and Mucus for Amœbæ, see Dysentery, Vol. II.

Amœbic Dysentery. Difficulty in treatment and diagnosis of chronic cases whose course is often marked by alternating diarrhœa and constipation. Presence of *E. histolytica* cysts in stools can only be verified in about 30% of cases. In a further 40% diagnosis is supplied by use of **sigmoidoscope** and remainder is based on course and history of the case.—P. H. Manson-Bahr, B.M.J. ii./21,1115.

Intestinal parasites found in symptomless carriers—*E. histolytica, E. coli, Giardia intestinalis, Chilomastix mesnili* and *B. coli* found on examination of stools of 120 patients in Jamaica Hospital.—H. H. Scott, per Jl. Trop. Med., Feb. i/23,49.

Intestinal protozoa endemic in Britain. *E. histolytica* found in a case of ulcerative colitis in a patient who had not been abroad —B.M.J. i/21,276.

If no response to Emetine within three days, the case is not amœbic dysentery.—B.M.J. i./13,1358.

Bilharziasis. A total of 14 grains and a further total of 20 grains spread over a long period was not effectual but cure eventually under Antimony intravenously.—A. H. Harkness, B.M.J. ii./20,890.

As much as 0·12 Gm. (single dose) given intravenously in bilharzia. Ten to 12 injections at 3 to 5 days interval will cure, the total amount given being from 0·85 to 1·05 Gm.—Diamantis, B.M.J. i./21,70. *See also* B.M.J.E. i./20,33.

10 intradeltoid injections with 4 days' rest between each.—E. Debbas, Presse Med. d'Egypte., Feb., 1920, per Pres., Feb. 21,48.

Four 3 grain doses every third day intramuscularly sufficient. A child will stand 2½ grains.—'B.H.', B.M.J. i./21,586.

Commence with ½ grain initially intramuscularly for an adult and ⅓ grain for a child and work up to 1 grain for a child of 12. Injections generally given daily for 3 days and then 3 times a week for 3 weeks. Iron and Arsenic as tonic.—F. G. Cawston, L. ii./21,1049.

Japanese Bilharzia disease well treated by Emetine but there may be severe cardiac depression.—F. G. Cawston, B.M.J. ii./21,1031.

Emetine Hydrochloride, ⅛ to ¾ grain, in 1% Phenol solution intramuscularly, on alternate days, eradicates permanently.—F. G. Cawston, Jl. Trop. Med., May, 1922,112; B.M.J.E. ii./22,29.

See also Trolli, Jl. Trop. Med., May 1/23,149.

Bilharziasis in child of four (Natal) permanently cured by Emetine injections for 29 days, beginning with 1/3 grain and working up to 2/3 grain for last two injections. Vomiting the only toxic effect. Oral treatment would have been preferred. Emetine Periodide should be of special service in Egypt and China where schistosomiasis is so commonly associated with other parasites of the bowel-wall.—F. G. Cawston, July 1, '27.

CHOLERA well treated by hypodermic doses of 0·01 to 0·04 Gm., combined with Camphor injections and Saline.—Renault, I.M.G., July, 1914.271.

GUINEA WORM. 17 cases treated successfully by Emetine given intravenously and *per os.*—E. Tournier, per Jl. Trop. Med., Mar. 15/23,101.

MORPHINE HABIT has been treated with Emetine, see **'Morphine Habit.'**

ORIENTAL SORE. 2 cases cured in three weeks by 2 injections of Emetine Hydrochloride.—Caliceti, per Jl. Trop. Med., June 1/23,201.

PYORRHŒA has been treated by Smith and Barett by local application of ½% solution in the hope of destroying *Entamœba buccalis* the organism thought to be responsible. In addition ⅛ grain hypodermically daily for 8 days, or a dose of ½ grain the first day and then after interval of a day ¼ grain on two successive days. A few drops of Liquid Extract of Ipecacuanha on the tooth brush as a routine measure might be useful—even as a prophylactic, or the following mouth-wash or pigment:

P1 **Pigmentum Ipecacuanhæ et Arsenici. R.D.H.** *Syn.* **Pigmentum Liquoris Arsenicalis.**

To be painted on the ulceration. *A drop or two only to be used.*

Ipecacuanha Wine ½ ounce, Glycerin 1 drachm, Liquor Arsenicalis to 1 ounce. *Caution Poison!*—F. B. Bowman, B.M.J. i./16,373. See also Sir L. Rogers, Ind. Med. Gaz., April, 1915.

Good result from a mouth wash of Emetine Hydrochloride ½ grain in water 8 ounces.—B.M.J. ii./18,188.

RHEUMATISM, acute articular, resistant to all other forms of treatment, cured by Emetine.—Trolli, per Jl. Trop. Med., May 1/23,149.

SPRUE treated by Emetine hypodermically and Vaccines.—Sir L. Rogers, L. i./14,1605.

TUBERCULAR HÆMOPTYSIS has been treated by 1 grain intramuscular doses with success.

The treatment relieves congestive conditions of the lung generally. Cardiac debility must be alleviated by other means first.—See also B.M.J. i./14,703; and Aubert Bouger and Chauffard, Bull. de l'Acad. de Med., Jan. 20, 1914; P.J. i./14,662.

TYPHOID has been treated by Emetine ½ grain hypodermically given as early as possible and repeated every 6, 8 or 12 hours till maximum afternoon temperature is within 1 to 1·5° of normal, after which ½ doses until normal. Should not be used as an abortant after the third week of the disease except in very small doses, as serious hæmorrhage is likely to be produced.—W. L. Frazier, Med. Rec., March 20th, 1915.

Ⓟ **'Sterules' of Emetine Hydrochloride** are prepared 1/6 grain (**0·01 Gm.**), ¼ grain (**0·016 Gm.**), ⅓ grain (**0·02 Gm.**), ½ grain (**0·03 Gm.**), in 15 minims (**1 Cc.**), and 1 grain (**0·06 Gm.**) in 20 minims (**1·2 Cc.**).

Ⓟ **Emetine Stearettes** 1/3 grain. Emetine *per os* in amœbic dysentery gives good effect but not so rapid as hypodermically.

1/3 to 2/3 grains may be given without exciting any great nausea. —Sir C. P. Lukis, B.M.J. i./13,1357. The Stearettes protect the Emetine from the action of the gastric juice.

Ⓟ **Vinum Emetinæ**, 4 grains of the Hydrochloride in 8 ounces of Sherry. Equivalent to Ipecacuanha Wine. *Dose.*—5 to 45 minims (0·3 to 3 Cc.).

P1 Emetine Hydrobromide.—$C_{29}H_{40}N_2O_4 2HBr, 4H_2O = 714·248$.

Dose—as for Hydrochloride.—*q.v.* for details.

White crystalline salt. *Soluble* about 1 in 70 only, of water hence the Hydrochloride should be prescribed in preference. The addition of a little Hydrobromic Acid does not affect solubility.

Ⓟ **Sterules of Emetine Hydrobromide,** ¼ grain in 25 minims (1·5 Cc), and ½ grain in 40 minims (2·5 Cc.) are prepared.

P1 Emetine-Bismuth-Iodide.$C_{29}H_{40}N_2O_4.2HI.BiI_3.H_2O(?) = 1344·028$

Dose.—Three grains (0·2 Gm.) [= approximately 1 grain (0·06 Gm.) of Emetine, or about 60 grains of Ipecacuanha] constitutes the average daily dose given after a full meal or last thing at night. Twelve doses are given in succession to make up the course. A less quantity, it is stated, may only lead to a relapse. A total of 60 to 70 grains (4 to 4·6 Gm.) may be necessary in some cases.

A brick-red powder containing approximately 30% Emetine. (1 Gm. Emetine-Bismuth-Iodide = 0·4 Gm. nearly Emetine Hydrochloride $C_{29}H_{40}N_2O_4$, 2HCl, $6H_2O$.)

Manufacture.—Solve Emetine Hydrochloride 660 Gm. in water 32,000 Cc. and treat with excess of the following solution:—Bismuth Carbonate 290 Gm., Potassium Iodide 920 Gm., Concentrated Hydrochloric Acid 900 Cc., or *q.s.* to clear, and water 16,000 Cc. Collect precipitate, wash and dry at 40° C.

The formula we give for the compound indicates 35·7% of Emetine, but the substance is not a very definite compound—there is chance of loss of Emetine in the washing. *It should contain at least* 30%.

Solubilities.—Emetine-Bismuth-Iodide was introduced under an erroneous view. In contact with Physiological Acid the Emetine of the compound *is dissolved,* Bismuth Oxychloride being formed. It was, in other words, introduced under the mistaken impression that it passed the stomach intact. We gave details of experiments disproving this in our 17th Edn., p. 517, see also L. i./23,158.

Administration.—Preferably as "Stearettes" or Salol-coated Pills (Keratin coating is of little use). Some, it is true, give it in slipules or cachets, uncoated, without heeding the vomiting. Even when given 'coated' there are often vomiting, purging, abdominal pain and cardiac depression from it.

Uses.—In particular it was advocated by Du Mez for treatment of *Entamœba histolytica* infected patients. It was said to be effective in removing cysts of the *amœba* from the fæces of chronic carriers, whilst treatment with Emetine hypodermically has been followed merely by an early recurrence of cyst-passing. (*See also* '*E.P.I.*')

A Medical Research Committee Report, reported it cured the majority of carriers. Large quantities are essential—not less than 30 to 40 grains in daily doses of 3 to 4 grains.

Histolytica-infected patients treated. Given *per os* on a full stomach in cachet. 1 grain thrice daily until 36 grains are given. The results surpassed the most sanguine expectations. Specific. Cysts and *amœbæ* vanished from fæces. No relapses; whereas with Emetine Hydrochloride there were 17 relapses out of 24 cases treated. It is harmless to the other protozoa of the human bowel.—C. Dobell, B.M.J. ii./16,612,626. *See also* M. W. Jepps and J. C. Meakins, B.M.J. ii./17,645.

From the epidemiological as well as the medical standpoint this destruction of the encysted stage of the entamœba is of paramount importance. Hypodermic use of Emetine does not effect this. Best given at 10 p.m.—C. G. Imrie, and W. Roche.—L. i./17,17.

EMETINE DIARRHŒA.—Within limits this can be aimed at—it was aimed at in the old Ipecac. treatment The bowel is thoroughly washed out—in addition to the specific effect. A few days after the course (12 doses) the stools become normal.—G. C. Low, B.M.J. ii. 17,484.

Emetine Bismuth Iodide is of value in early stages and is capable of curing about 50% at that period, but when the disease becomes chronic it has proved a failure. Emetine alone in the acute phase is better, followed by Emetine Bismuth Iodide later. Risk of irritating action of Emetine Bismuth Iodide on the acutely inflamed bowel leading to serious intestinal hæmorrhage if used earlier.—P. H. Manson-Bahr, B.M.J. ii./21,1115.

At times the compound proved so unpleasant to patients that they would not take it.—Sir P. Bassett-Smith, B.M.J. ii./21,1115.

A good deal of the disrepute into which Emetine Bismuth Iodide has fallen may be due to the fact that we focus our attention on the one relapsing case that does resist all forms of treatment, and forget the 99 that go their way rejoicing. Chenopodium Oil should be tried in cases resisting Emetine treatment.—G. W. Goodhart, L. i./23,157.

Vomiting, if delayed (four hours after taking E.B.I.) does not mean that it will not be absorbed. It appears to indicate that it is beginning to take effect.—P. Manson Rennie, L. ii./22,1374.

Ⓟ 'Stearettes' of Emetine-Bismuth-Iodide 1 grain (**0·06 Gm.**), 2 grains (**0·12 Gm.**) and 3 grains (**0·2 Gm.**)

These pass intact through the stomach and dissolve on reaching the alkaline juices of the duodenum and intestines, providing the alkalinity and bile secretion be adequate to effect the chemical reaction necessary. We proved some years ago that Keratin coating is practically useless.

Salol Coated Pills of the same strength are also made.

Major C. D. Roe, D.S.O., 4th Gurkhas, Bakloh, Punjab, India, states he was completely cured of Entamœba Histolytica dysentery (contracted in the Dardanelles) by Stearettes of Emetine-Bismuth-Iodide.

Combined Treatment by Emetine Hydrochloride 1 grain hypodermically for 5 days and three grain Salol-coated Emetine-Bismuth-Iodide pills daily for 12 days successful. Dilute Hydrocyanic Acid given to check vomiting.—H. L. Watson-Wemyss and T. Bentham, L. i./18,403. See also A. C. Lambert, B.M.J. i./18,116.

P1 Emetine Periodide (termed for short '**E.P.I.**') $C_{29}H_{40}N_2O_4.6I$ =1241·928.

Dose.—In the treatment of amœbic dysentery the compound has been given as a course of 2 grains (**0·12 Gm.**) thrice daily for 15 days, after food, generally in Slipules and in conjunction with Slipules of Exsiccated Ox Bile, 5 grains (**0·3 Gm.**) each, taken simultaneously.

Manufacture. By the interaction of Emetine and Iodine in a suitable solvent. The Periodides vary according to the methods used.

H. M. Gordon and A. B. Prescott, Jl. Am. Chem. Soc., 1899, p.237, prepared two different Emetine Periodides by precipitation on mixing a strongly acid solution of Emetine in water with a solution of Iodine in Potassium Iodide. To one they gave the formula $C_{28}H_{40}N_2O_5,HI.I_7$. We are ***not*** concerned with a hydriodide-periodide.

'E.P.I.' forms a dark purple crystalline powder containing about 38·7% Emetine and 61·3% Iodine.

Solubilities.—Insoluble in water and ether, but readily soluble in Acetone, and slightly soluble in Alcohol and Chloroform. Practically insoluble in physiological acid (0·2% Hydrochloric Acid).

Uses.—For amœbic dysentery and other protozoal infections essentially. In addition, it is suggested in sprue, cholera, typhoid and infections where Emetine in other forms has been tried. Brilliant results have recently been obtained with it in schistosomiasis. Being insoluble in the stomach, it causes no nausea or vomiting.

SCHISTOSOMIASIS.—The oral use clears up the urine of children intensely infected with *S. hæmatobium* as quickly and with almost as great certainty as Emetine Hydrochloride subcutaneously and without risk. One grain of the Periodide thrice daily for 15 days was given.—R. M. Gordon, Ann. Trop. Med. and Parasit., Aug. 13/26,229, B.M.J.E., ii./26,76. For tropical use, it is suggested, a preparation of **Emetine Periodide in Dried Milk** (1 grain in 2 drachms, *i.e.*, 8 Gm.) will be of value. *Directions.*—Two heaped teaspoonsful in 30 ounces (½ cupful) of warm water.

Amœbic Dysentery.—The use of the compound in refractory cases of amœbic dysentery was the result of research work conducted by the author at the request of J. Graham Willmore.

More recently a continuation of the investigation led to the introduction of **Auremetine** (page 537), which has been found to be more effective in many resistant cases.

Willmore, in his first paper on the subject, communicated to the Royal Society of Tropical Medicine and Hygiene, London, May, 1923, showed that it seemed desirable to supplement medication *per os* by medication per rectum, more especially where ulceration of the lower bowel was indicated by preliminary sigmoidoscopy.

It became, therefore, the practice to give Emetine Hydrochloride 1 grain daily, intramuscularly, and 1 drachm of Emetol (page 535) daily, per rectum; each for six days on alternate days.

Concurrently, 2 *grains of Emetine Periodide were given in Slipules per os three times daily for fifteen days with* 5 *grains of Fel Bovinum thrice daily* in separate Slipules. The periodide was given after food.

(Emetine Periodide has also been given in conjunction with Stovarsol, see page 536, better results having been obtained with the combination than with either drug alone.)

Emetine Periodide appeared to be by far *the most efficacious and, at the same time, the least toxic of all the Emetine Preparations then tried,* and it may well supersede Emetine Bismuth Iodide for oral administration.

Emetine Periodide had the advantage of allowing an intensive course of 90 grains to be given in the short period of 15 days, and, if necessary, this was repeated after about 10 days' interval; compared with E.B.I., it therefore shortens the period in hospital.

It caused no nausea, vomiting, depression and weakness, which usually attended the use of E.B.I. No cardiac dilatation, no emetine rash or desquamation and no neuritis, following 120 grains given in 20 days, were noted. It appeared to be at least as effective as Emetine Bismuth Iodide—if not more so. On the other hand, it is only fair to remember that the cases treated with Emetine Periodide all came under the category of the "insoluble residue," *which had proved refractory to all the known standard methods of anti-amœbic treatment.*

Upwards of 400 cases were dealt with—cases, it should be remarked, that had been under treatment, many of them for years, with every possible known type of medication.

'Alcresta,' Simaruba, Ravaut's Paste, Bismuth, irrigations of Gallic and Tannic Acids, Salvarsan, Oleum Chenopodii, Antimony, etc., may be of use in some cases, but they are only palliative. Ipecacuanha, in various forms in massive intensive courses, and in small doses over months, did not succeed where emetine preparations failed.

Further, an intensive emetine treatment was exceedingly unpleasant and depressing, and not altogether devoid of danger.

These cases were not refractory to Emetine only. 'Bayer 205,' Yatren, Conessine intravenously, Conessine-Bismuth-Iodide, Naphthalene Tetrachloride, Oleum Chenopodii, 'T.C.P.', by the mouth and *per rectum*, Dimol, Kerol, Proposote, Creosote, Turpentine, etc., and Kurchi, in decoction, paste and tabloids, were all tried without success.

It is thought that efforts for a radical cure must centre round Emetine, and, of the Emetine preparations, the Periodide possesses distinct advantages.

Action of Physiological Acid.—Unlike Emetine Bismuth Iodide, which was introduced under the erroneous assumption that it was not decomposed in the stomach, Emetine Periodide is practically unattacked by physiological acid, even on keeping in the incubator at body temperature for two or three hours. On the other hand, in Physiological Alkali at 40° C. is is split up gradually into Emetine Base and Alkali Iodide. The Emetine Periodide, therefore, is insoluble in the stomach but slowly liberates Emetine base in the intestines.

To summarise :—

1. Sigmoidoscopy should be performed with the utmost care, always without an anæsthetic, the instrument being guided by the eye. It is dangerous, however, to rely entirely on these findings in making a prognosis, since only some 30 cm. of the bowel can be seen. The infection appears to trickle down the bowel.
2. If any benefit is to accrue from treatment it will be apparent quickly, and nothing is ever to be gained by pushing treatment that does not show early results, clinical if not protozooscopic.
3. Emetine in any form is a poisonous drug, and extreme care is always necessary in its administration. Different individuals vary greatly in their susceptibility, the utmost caution being urged in all cases where the myocardium is affected by such diseases as malignant tertian malaria, severe influenza, pneumonia, diphtheria, etc. Patients must be kept at absolute rest during its administration in concentrated form.
4. Surgical measures, such as appendicostomy and cæcostomy, may be required to save life in exceptional cases but they are not followed by a greater percentage of ultimate cure.
5. There is reason to think that E.P.I. evokes the cooperation of the tissues in combating *E. histolytica* infection.

Reports on Emetine Periodide (mentioned in the Discussion.)

G. C. Low tried 'E.P.I.' on six cases, most of them chronic resisters, and four of these were apparently going on satisfactorily, as they had not reported themselves again. Two had relapsed : one with well-marked signs of hepatitis and threatening liver abscess (*Entamœba histolytica* cysts in stools); the other parasitically, eleven days after cessation of treatment (*E. histolytica* cysts in stools).

A. Castellani confirmed Willmore's statements. He had used 'E.P.I.' in private practice on a fairly large scale and results had been equally satisfactory. It does not cure every case of chronic dysentery, but it is an extremely useful drug.

C. Morley Wenyon was convinced that E.B.I. gave no better results than Emetine itself. He did not agree with Etherised Emetine injected *per rectum* to penetrate the shell of the cyst, and drew analogy with the egg of the ankylostome. One could not treat ankylostomiasis by killing the egg.

P. H. Manson Bahr had tried E.P.I. in three chronic resistant cases. One relapsed in 50 days, one had remained free from symptoms for three months.

For further details consult the 18th Edition or the original paper by J. G Willmore and W. H. Martindale in the Trans. Roy. Soc. Trop. Med. and Hyg., 1923, *Vol. XVII., pp.* 13—32.

R. M. Gordon treated sixteen cases and of these ten relapsed.—Ann. Trop. Med. and Parasitol., Vol. XVII, p. 381.

Sir William Willcox states that he has used Emetine Periodide with success.

Emetol. (*Willmore—Martindale.*)

A solution of Emetine base, 1 grain (0·06 Gm.) in 2 drachms (8 Cc.) of Olive Oil, for rectal administration in amœbic dysentery.

Dose.—Two drachms are added to 4 drachms (15 Cc.) or 6 drachms (23 Cc.) of Ether and 8 ounces (230 Cc.) of Olive Oil for use.

This is injected slowly—after a preliminary lavage—into the bowel, the patient being maintained, by the aid of bed-blocks and pillows under the hips, in as "inverted" a position as possible. Injections are usually given every other day, six to twelve completing a course. They are not disliked by the patient and no untoward effects have been observed. The odour of Ether appears in the breath about five minutes from starting the injection, whether given *per rectum* or through cæcostomy or appendicostomy openings.

Sigmoidoscopy has confirmed the good effects of the treatment *in the areas which it can reach*; but as the addition of Bismuth and radioscopy showed that it does not seem to travel farther than the distal third of the transverse colon, it naturally has no effect on infection of the colon proximal to this limit. A more voluminous enema is not usually tolerated.

That the absorption of the Emetine is really occurring, slowly and continuously, is, in all probability, proved by the fact that when 10 grains of quinine base were administered in ether-oil to a cæcostomy case, the alkaloid first appeared in the urine in four hours and quinine was still present in twenty-four hours; whereas 10 grains of quinine hydrochloride administered in the same way, but dissolved in 8 ounces of water, first showed in the urine in under two hours, and the drug was completely eliminated in twelve hours. Years ago, in Egypt, the effect of lavage by watery solutions of Emetine salts, in doses up to 5 grains to 1 ounce, were tried, but such disappointing results were obtained that they were abandoned.

OTHER PREPARATIONS
tried in amœbic dysentery.

Ipecacuanha.—In bolus, in cachet, in membroids, etc., in intensive doses of 30 to 45 grains a day, in smaller doses for months—and **Alcresta** have already been referred to. They were even less effective than Emetine Hydrochloride intramuscularly and Emetine Bismuth Iodide.

Ravaut's Paste is undoubtedly a useful adjunct in many cases, but it seems to keep the disease in check only as long as it is being regularly taken, and to have no real curative value.

In dose of 2 to 10 tablespoonsful on the first day; second day a capsule containing 0·1 Gm. Novarsenobenzol, third day the paste, and so on alternately for 10 to 20 days. P. Ravaut (Paris Med., Aug. 16/19, p. 125., Abst. Pres., Oct. 20, p. 354) reports: In amœbic dysentery there was no vomiting. Appetite improved.

It has the composition:—

Bismuth Carbonate 100, Wood Charcoal 100, Ipecacuanha 4 to 6, Syrup 100, Glycerin 100.

Pastils of Ravaut's Paste were made, each equivalent to half-drachm, *i.e.*, two for dose. They can be swallowed whole, and have been well tolerated.

Decoction of **Simaruba** and **Granatum** was also ineffectual.

Kurchi Bark. A decoction of this bark and in compressed form has been used very extensively, and is considered of real value. It does not eradicate the infection but it at least keeps the amœbæ under control in all but the exceptional cases mentioned.

Activated Quinine (freshly activated with Potash prior to use) was tried as enema but in all of 22 cases there was relapse.

It is often of value when combined with treatment *per os.*

Conessine, the alkaloid of Kurchi Bark.—Major H. C. Brown found that this was equally as inhibitory to the growth of free-living amœbæ as was Emetine. Since then it has been found that the toxicity of Conessine in vitro to certain protozoa is considerably increased in presence of alkali. To the protozoa used in the experiments Quinine Bihydrochloride was only slightly toxic, neutral Quinine hydrochloride more toxic, and Quinine base still more so, whilst the maximum is reached when Quinine base is applied in presence of alkali. If the toxicity of alkalinised Quinine to amœbæ is taken as 1, then Emetine is 5 times and Conessine is 14 times more toxic. It was therefore thought that Quinine base in alkali might be worth trying, Quinine being a harmless substance to begin with, and the results, so far, have been promising. It is probable that the other two alkaloids might be tried under the same conditions.—T. A. Henry, Roy. Soc. Trop. Med., May, 1923.

Ⓟ **Paremetol** and Ⓟ **Emetine Oleate,** see Edn. XVIII., pp. 526,527.

Stovarsol.—In view of the optimistic reports in the French Medical Press (*e.g.*, E. Marchoux, Jl. Trop. Med., July 2/23,237; Nogue, *ibid.* Nov. 1/23,336), trials were made (1924) with this compound.

More cases were apt to relapse after it than after Emetine Periodide, but by combining the two drugs—giving 6 grains of Emetine Periodide and 8 grains of Stovarsol on alternate days, 10 each—the results obtained were better than with either drug singly.

When hepatitis is present, Emetine Hydrochloride hypodermically is combined with the above, and when sigmoidoscopy shows active changes, either Emetol in Ether-oil or activated Alkaline Quinine is given *per rectum* in addition.

The claim that Stovarsol (the same is true of CCl_4) cures *lambliasis* is absurd and may be dismissed at once; so far nothing has been found to eradicate this infection *in vivo*, and the best palliative treatment is still rest in bed, a milk diet and a simple Bismuth and Paregoric mixture with carminatives. Further, since fractional analysis shows that complete gastric achlorhydria is usually present in lambliasis severe enough to cause symptoms, it seems illogical to expect better results from medicines given by duodenal tube. Dilute Hydrochloric Acid in doses of 1 to 1½ drachms had no effect, clinical or other.—J. Graham Willmore, 1924. (*Lamblia* ref.—E. Marchoux, Jl. Trop. Med., Sept. 15/23,295.)

Arsenobenzene and Emetine a useful combination—persist with resistant cases.—Jl. A.M.A., 1./26,457, per Pres., Jan. '27,15.

Arsenobenzol, 0·1 Gm. tablets, 2 to 6 daily, found efficacious: cysts destroyed.—Presse Med., Apl. '26,497, per Pres., Jan. '27,15.

Treparsol, 4 tablets daily, has been used.—Pres., Jan. '27,15.

Recently, good results have been obtained in amœbic dysentery by the use of **Stovarsol** in conjunction with **Auremetine** (see page 537).

∗ P1 **Auremetine** (T.M. 471016).

Dose.—In amœbic dysentery 1 grain four times daily in slipules to a total of 40 or 60 grains, or even 120 grains, by repetition of the course.

A combination of the Periodides of Emetine and Auramine containing approx. Emetine 28%, Auramine 16% and Iodine 56%.

Pharmacology.

The potentialities of the aniline dye Auramine (*q.v.*) have been described by Fairbrother and Renshaw. It was thought that a combination of Auramine and Emetine might be more effective than Emetine Periodide, and as the result of experiments in the author's laboratory Auremetine was produced. Like Emetine Periodide it has the advantage of being **practically insoluble in the acid of the stomach** (only about 5% is decomposed after 4 hours at 40° C). and it is slowly split up in the intestines with the liberation of the dye and Emetine base. Experimentally, nearly 20% of the substance was decomposed after 4 hours in Physiological Alkali at 40° C., but in the human intestine it is probable that an even more extensive decomposition occurs, since its administration is quickly followed by the passage of orange-coloured fæces.

Major H. C. Brown found that Auremetine, using a suspension in gum solution, was inhibitory to the growth of free-living amœbæ nearly to the same extent as Emetine or Conessine under the same conditions.—B.M.J. i./26,526.

Auremetine is a stable, dark maroon powder, insoluble in water.

Uses.—In amœbic dysentery Auremetine is a further advance in treatment upon 'E.P.I.'

Its use is not attended by vomiting, nausea, abdominal pain, or purging. It is less depressing than Emetine hypodermically, and it is not necessary to keep the patient in bed on this account alone.

The following information, from a paper by J. Graham Willmore and W. H. Martindale (B.M.J. i./26,525), is based on the results of its use since 1924, and has recently been confirmed (1927).

1. **'Acute' cases**—that is, those with blood, mucus, and *E. histolyticæ* in the stools, or found in scrapings at sigmoidoscopy receive :—

(*a*) Auremetine 1 grain in gelatin capsule four times daily after food, on alternate days for seven days, and then daily to a total of 40 or 60 grains.

(*b*) Stovarsol 4 grains three times daily for seven days, on alternate days with the Auremetine. Previously 4 grains twice daily for ten days, alternating with the Auremetine days, or even to fifteen days, was given.

(*c*) On Stovarsol days a rectal injection of Emetol, 2 drachms (= 1 grain emetine base), in ether 6 drachms and olive oil 12 ounces. (Time retained to be charted.)

(*d*) 'Panama bismuth' three-hourly for twenty days, and then three times daily.

2. **'Chronic' or cyst-carrying cases** are given :

(*a*) Auremetine, and (*b*) Stovarsol, on alternate days as described above.

(*c*) 'Panama bismuth,' three times daily before food.

3. When hepatic involvement is present 1 grain of emetine hydrochloride intramuscularly, alternate days for six days (that is, 6 grains in all), may supplement or replace the Emetol.

'Panama Bismuth.'—It has been the custom to administer massive doses of bismuth subnitrate (James and Deeks, Panama) in addition to other treatment. While this drug alone has never been found to cure it is a good adjuvant to any form of specific treatment. In the 'acute' cases a heaped teaspoonful, stirred up in soda water, was given every three hours (during the day, not at night) for twenty days, and then three times daily for an indefinite period; in the cyst-carriers it was given three times a day from the beginning. Symptoms of poisoning were not observed, even when it has been continued for months. See, however, *antea*, p. 528. Routine sigmoidoscopic examination is important.

Stovarsol.—When given by itself it was followed—even after the fullest course considered safe—by a greater proportion of relapses than was Emetine Periodide; but when given with the emetine preparations better results were obtained than with either drug singly.

Toxic Effects of Stovarsol.—Certain individuals may show an idiosyncrasy towards Stovarsol, especially after repeated courses. At least one death from this drug has been heard of, and one case under treatment developed intense dermatitis with purpuric spots after only 8 grains. The practice of giving one tablet every three hours until twelve have been taken—as advocated by some—is dangerous, and has not been found to give better results than any other method. As a minor measure of precaution patients are given glucose (1 lb. in 1 quart of orange and lemon water, to be taken in twenty-four hours) daily during its administration.

Results of Auremetine and Stovarsol.—The cases dealt with were the residue of pensioners infected during, or before, the great war, many of whom had been through every dysentery centre in the country.

Preparations derived from sources other than ipecacuanha—such conessine, Stovarsol, Bayer '205,' a varied group of so-called intestinal disinfectants, flavine, etc., Yatren, given by the mouth and enema, caused much disappointment.

Of 40 such cases treated by the method described, 37 or about 92% 'responded,' *i.e.*, the patient regained his health, lost all clinical signs and symptoms of his disease (including sigmoidoscopic findings), his stools were negative on repeated examination, and so far as can be ascertained he has remained well and free from evidence of infection for a minimum period of six months after completion of treatment. It is impossible to give a guarantee of permanent cure in a case of chronic amœbic dysentery; a man, who months or even years before it had been hoped was cured, may be readmitted to hospital a wreck, at the point of death from intestinal or hepatic amœbiasis.

The high proportion of responses may, therefore, be too optimistic but it is claimed that the present method of treatment—especially the introduction of Auremetine—has given some gratifying and more hopeful *immediate* results than any other essayed.

Methyl-psychotrine 0·015 to 0·033% and *Emetamine* 0·002 to 0·006%, two new alkaloids in Ipecacuanha, isolated by F. L. Pyman, P.J. i./17,360; C.D. Apl. 28/17. The former has no effect on *E. Histolytica* nor *Lamblia* infections. —M. W. Jepps & J. C. Meakins, B.M.J. ii./17,645.

Emetine and Iso-emetine are apparently stereo-isomerides, although the

attempt to convert one into the other has not been successful. Iso-emetine is the methyl ester of Isocephaeline.—F. L. Pyman, J.C.S.T., 1918, 113,222.

$\boxed{\text{P1}}$ **Cephaëline.** $C_{28}H_{38}N_2O_4 = 466{\cdot}32$.

A crystalline alkaloid, less soluble in ether than emetine, but soluble in caustic alkali solutions, and also darkens on exposure.

By Methylation it is converted into Emetine *q.v.*

$\boxed{\text{P1}}$**Cephaeline Hydrochloride,** $C_{28}H_{8}\ N_2O_4 2HCl = 539{\cdot}214$.

In doses of $\frac{1}{12}$ to $\frac{1}{6}$ gr. said to be a more powerful emetic than Emetine .

Ⓟ**Emetin—Extractive**

Dose.—Expectorant $\frac{1}{16}$ to $\frac{1}{10}$ (0·004 to 0·006 Gm.) emetic ½ to 1 grain (0·03 to 0·06 Gm.), in pill or solution. An extractive substance soluble in water; must be distinguished from Emetine.

LAMELLÆ.

Ophthalmic Lamellæ or Discs (*cf.* Index—Lamellæ—for the various medicaments employed) are prepared with Gelatin and a proportion of Glycerin. *B.P.* '14.—The discs are 3 m.m. ($\frac{1}{8}$ inch nearly) in diameter. Directions are given.

$\boxed{\text{P1}}$**Atropine Sulphate** *B.P.* '14 weigh $\frac{1}{50}$ grain $= \frac{1}{5000}$ grain in each.

$\boxed{\text{D}}$ $\boxed{\text{P1}}$ **Cocaine Hydrochloride** *B.P.* '14 weigh $\frac{1}{20}$ grain $= \frac{1}{50}$ grain in each. Ⓟ**Homatropine Hydrobromide** *B.P.* '14 weigh $\frac{1}{32}$ grain $= \frac{1}{100}$ grain in each. Ⓟ**Physostigmine Sulphate** *B.P.* '14 weigh $\frac{1}{50}$ grain $= \frac{1}{1000}$ grain in each.

Medicated Gelatin Lamels.—Thin pliable gelatin sheets of size 9 cm. by 6 cm.. divided into 24 squares, each square representing a dose. The sheets are sterilised and will stand variations in climate.

Medicaments.—Acetyl-Salicylic Acid 2½ to 5 grains, Bismuth Subnitrate 2½ grains and upwards. Calomel 1 or 2 grains with or without a dose of aperient, Cascara Extract 2 grains, Chlorodyne 5 minims, Coca Extract ½ grain, Dover's Powder 5 grains, Easton's Syrup 30 minims, Ipecacuanha ¼ to 2 minims, Morphine Hydrochloride 1/6 grain, Phenacetin 3 grains, Podophylin 116 grain with 5 minims strong Tincture of Ginger, Quinine Sulphate 2 grains, Strong Tincture of Ginger 5 minims, Tincture of Opium 5 minims, Vegetable Aperient.—L.1./15,283. ***Caution.***—Several of these are poisons in the meaning of the Act and may come under $\boxed{\text{D}}$.

LECITHIN, OVO-LECITHIN. PH. NED. V.

$C_{42}H_{84}NPO_9(?) = 777{\cdot}707$.

Choline Di-Stearo-Glycerophosphate.

Dose.—Internally 3 to 5 grains (0·2 to 0·3 Gm.) preferably half an hour before meals, *vide* Emulsion. This dose may well be increased if it is digested, as an average egg contains 16 grains approx.

Subcutaneously ¾ to 2 grains (0·05 to 0·12 Gm.) in sterile olive oil every second day.

Manufacture.—It should be prepared from egg yolks by alcohol extraction.

For the Chemistry of Lecithin and its examination, vide Vol. II.

A yellowish wax like mass. It is a constituent of the brain 11%, and of yolk of egg 7%; milk, human, cows', etc., contains varying amounts, *cf.* Vol. II.

An average egg weighing about 50 Gm., of which 30% or 15 Gm. is yolk, is capable of yielding 1·08 Gm. (16 grains) of Lecithin. The dose of Lecithin being 3 to 5 grains thrice daily, *i.e.*, 15 grains as maximum per day, is just short of that contained in a single egg. Lecithin is a drug rather than a food, though its presence in some foods possesses a singular influence on the growing organism.

Lecithin is broken up by the pancreatic juice into Glycerophosphoric Acid, fatty acids and choline,—the last substance if absorbed in quantity might well induce toxic effects, but bacterial enzymes break up Choline into CO_2, Marsh Gas and Ammonia and thus the organism is protected.—L. i./13,1295.

Soluble 1 in 30 of 90% Alcohol, Ether 1 in 5, Chloroform (particularly), Carbon Bisulphide, Benzol and fatty oils. Swells up with water forming a kind of Colloidal Solution. It combines with certain metals, *e.g.* Copper.

Flavoring.—Prescribed as Elixir or Emulsion *q.v.*

Uses.—Where the phosphates excreted by the urine are high. Given in neurasthenia, various nervous diseases, diabetes, tuberculosis, tabes and general paralysis; also in all diseases producing a disturbance of nutrition. It is said to cause a marked increase in patient's weight, and to improve the general well-being; augments the blood corpuscles. Rickets and marasmus have been successfully treated with lecithin, and intramuscular injections of Sterile Oil Solution have also given relief. Use suggested in incipient tuberculosis, osteomalacia, pernicious anæmia, and the like.

Has given good results in myasthenia gravis (Gowers).

Elixir Lecithin. *Dose.*—2 drachms containing 3 grains of Ovo-Lecithin, thrice daily half an hour before meals.

Emulsio Lecithin. *Dose.*—Half ounce, containing 5 grains of Ovo-Lecithin, thrice daily, as the Elixir.

No very hot fluids should be drunk for some time afterwards, so that the composition of Lecithin may remain unaltered.

In menorrhagia 1½ to 3 grains of Lecithin thrice daily between the periods has been found useful.

Sterules for Intramuscular Injection. *Dose.*—1 Cc., equivalent to ¾ grain (0·05 Gm.) of **Lecithin** (prepared with oil). Some patients complain of pain. $\boxed{\mathfrak{D}}$ $\boxed{\text{P1}}$ Cocaine Hydrochloride $\frac{1}{6}$ grain may be added. Also Ⓟ with Strychnine $\frac{1}{120}$, and $\boxed{\text{P1}}$ $\frac{1}{30}$ grain with **Guaiacol** ¾ grain.

Capsules and Tablets contain 1½ grains (0·1 Gm.). **Tabellæ** of chocolate basis contain ½ grain.

Pilula Lecithin.—Lecithin 1½ and 3 grains, made with white wax ½ and 1 grain.

Lecithin is contained in **Pilula Potentin Composita**, *q.v.*

Ⓟ ✱ "**Byno**" (T.M. 215670)-**Lecithin.** *Dose.*—One tablespoonful three times a day half an hour before meals. A proprietary containing Lecithin, Liquid Malt Extract with Cinchona and Nux Vomica alkaloids. Digestive nerve tonic and food. Each ounce contains 4 grains of Lecithin.

Lecitogen. *Dose.*—3 to 4 drachms. A Cocoa preparation containing 1% Lecithin, 22% nitrogenous material, 25% fat, 8% starch.

Effervescent Lecithin 3 grains in 1 drachm (a dose) is prepared. This preparation froths up considerably when added to water for consumption—in this respect it is a little inelegant pharmaceutically. The frothing is unavoidable.

Pilula Lecithin cum Ferri Iodido.—*Martindale.*

Contains 2 grains of Lecithin with 3 grains of Ferrous Iodide. In anæmia to increase metabolism and as a tonic in convalescence.

Powdered Lecithin. *Dose.* — 10 to 15 grains (0·6 to 1·0 Gm.) thrice daily before food as powder or cachet.

A light yellowish powder containing 33% Lecithin flavoured with Saccharin and Peppermint Oil. When given prescribed as powders the dose may be mixed with ½ wineglass of water.

Lipoids. Walker's "Organic Chemistry" suggest there are various forms of these fat-like substances. (1) Cholesterol (2) Cerebrosides. These contain Nitrogen but not Phosphorus, and on hydrolysis yield among other things Galactose. (3) Phosphatides or Phospho-lipines.—*e.g.* Lecithin. See also Sapones and Vol. II.

LIGATURES.

Catgut Ligatures are obtainable commercially 'Raw' and Sulpho-Chromic in hanks in sizes Nos. 000,000 (the thinnest) up to No. 8.

Preparation of Chromic or Sulpho-chromic Catgut Ligatures.

Lord Lister's Directions.—Soak the catgut 24 hours in twenty times its weight of 'preparing liquid'—made as follows :—Dissolve Chromic Acid 4 in water 240 (weight), add Sulphurous Acid Solution (*B.P.* '14) *q.s.* to produce *green* colour of Chromium Sulphate $Cr_2(SO_4)_3 = 392{\cdot}18$. Then add water to make 480 (weight), next add solution of Mercuric Chloride 2 in water 320 (weight). Dry the catgut on the stretch. The antiseptic Chromium Sulphate Solution, Lord Lister found the nearest approach to the ideal to produce a ligature capable of fulfilling the necessary conditions as to strength, elasticity and asepsis.

Ligatures are also supplied in carbolic acid solution 1 in 20, carbolised alcohol, turpentine, and various other antiseptics.

Immersion in **Clove Oil** 8 days, then in Alcohol 6—8 hours, has been advocated for sterilising. A further method is to heat the catgut gradually in **Cumene** to 70° C., then in the same substance to 170° C. for two hours. Finally to rinse in petroleum benzine.

By **Cumene** or **Cumol** is intended a hydrocarbon (a) Trimethyl-benzene $C_6H_3(CH_3)_3[1:3:4] = 120{\cdot}096$ obtained by fractionation of Coal Tar, it boils between 160° and 170° C.—when pure at 169·8° or (b) Isopropyl-benzene $C_6H_5CH(CH_3)_2$. The latter boils at 152° C.,—the former body is, therefore, more suitable for sterilising catheters. The names Cumol and Cumene, or better *Cymene*, as distinct from Cumene above, are, however, also given to *p*-Methyl-iso-propyl-Benzene $C_6H_4\left\{\begin{matrix}CH_3\\C_3H_7\end{matrix}\right. = 134{\cdot}112$. This is obtained from Cumin Oil, and can be made from Camphor. It boils at 175° to 176° C., has Sp. Gr. 0·8678 @ 12° C., and possesses a pleasant odour.

Hardening Treatment.—By soaking 1 hour (a) in 1 in 1000 Potassium Bichromate. These are two to three weeks—soluble or (b) more durable, *i.e.*, to last 5—6 weeks use 1% solution for same period. The gut is supplied in Xylol in sealed tubes.

Iodised Gut (Claudius' Method).—Raw gut, which has been previously soaked in Ether to remove fat, is sterilised by soaking in a solution of Iodine 1, Potassium Iodide 1½, Distilled Water 100 for ten days. (Some use weak Tincture of Iodine diluted 15 times with 50 % Alcohol.) About 4 ounces of Solution is sufficient for half a dozen hanks. The Gut is then of a brown colour, in a sterile pliable condition and ready for use—remove and place in 3% Phenol or Normal Saline prior to operation.

Iodine-Formalin Catgut.

Catgut prepared with Iodine and Alcohol is washed with a weak Carbolic Solution; it is then treated according to its thickness in a 3% Formalin Solution for twenty-four hours, and washed in water. Store in a solution of Alcohol 50% containing 5% Glycerin and 0·5% Iodine.

Vide also **Iodo-Acetone.**

Fr Cx. sterilises Catgut in absolute alcohol at 120° C. for 45 minutes in sealed tubes of hard glass.

Catgut sterilised with advantage by ether, chloroform, absolute alcohol or petrol in preference to "chemicals"—any one of them will render gut sterile in 24 hours.—G. S. Thompson, B.M.J. i./17,873.

Absorbable Iodine Catgut.—Catgut, defatted by ether, is boiled in absolute Alcohol for an hour, then placed in a solution of 1 part Strong Solution of Iodine and 11 parts of Water for a week. Keep in a solution of 1 part Strong Solution of Iodine and 50 parts Rectified Alcohol.—B.M.J. i./10,320.

Tabotamp.—Absorbable material made from catgut for packing wounds.

Kangaroo Tendon, St G.H. is washed with Ether Soap, treated with antiseptics and preserved in Alcohol.

Horsehair, St. G. H., is boiled in water 10 minutes only;

Palmyra Fibre or Malabar Fibre obtained from the fibrous netting surrounding base of the leaves of the Toddy Palmyras.—B.M.J. ii./17,780.

Roeder's Method. Picric Acid, saturated solution in Clove Oil. Leave the gut one week in this. Rinse 10 seconds in water and store in 95% Alcohol. In 4 days it is ready for use. It is an advantage to formalise in 5% solution for 24 hours first.—J. D. S. Sinclair, L. i./16,212.

Silk Sutures are supplied on reels and in hanks, sizes 0, 1, 2, also sterilised in Absolute Alcohol and Phenol Solution. Sterilised by immersing in Olive Oil for 12 hours and then boiling in the same and keeping in Carbolised Spirit, In infantile paralysis silk ligaments cause formation of a tough tissue or tendon.

Silkworm Gut, extra fine, fine, medium and stout—is made in 10 and 14 inch lengths.

LITHIUM.

Li=6·94.

Lithium Salts have long had a reputation for assisting in the elimination of Uric Acid, but their effect is probably analogous with corresponding Potash Salts. They should be given freely diluted.

Lithium Poisoning by large doses of Chloride taken experimentally, *e.g.*, 2 Gm. three times a day before meals. In all, 4 doses, *i.e.*, 8 Gm., were taken. After the 4th dose taken next night, there was marked dizziness and sleep was impossible. Weakness and tremors were intense the next day. Ocular and aural symptoms lasted 36 hours. There were no gastric intestinal symptoms and appetite remained good.—L. i./13,1815.

Lithii Benzoas, $C_6H_5COO\ Li = 127{\cdot}98$.

Dose.—2 to 10 grains (0·12 to 0·6 Gm.) or more.

Usually a light white crystalline powder, Antilithic, *Soluble* about 1 in 4 of water, about 1 in 12 Alcohol 90%. *Incompatible* with Acids and Sodium Bicarbonate.

Lithii Bromidum, $Li\ Br. = 86{\cdot}756$.

Dose.—5 to 15 grains (0·3 to 1 Gm.).

White, deliquescent, slightly bitter granules, neutral reaction; very soluble in water and alcohol.

Contains 91% Bromine as against 67% in Potassium Bromide, hence effect is greater, especially as a hypnotic, and in epilepsy.

Lithii Carbonas. $Li_2CO_3 = 73{\cdot}88$.

Dose.—2 to 5 grains (0·12 to 0·3 Gm.). **Tablets,** 5 grains. Soluble in water about 1 in 70. Diuretic, thought to increase the alkalinity of the blood.

Lithii Citras. $C_3H_4OH(COOLi)_3.4H_2O=281{\cdot}924$.

Dose.—5 to 10 grains (0·3 to 0·6 Gm.). **Tablets,** 5 grains. White crystalline powder. Diuretic. *Soluble* 1 in 2 of water.

Effervescent Lithium Citrate.

Dose.—1 or 2 drachms (4 to 8 Gm.). Contains 1 in 20.

✱**'Vescettes'** (T.M. 260597) of **Lithia**, contain 3 and 5 grains.

Lithii Citras Laxativus Effervescens, B.P.C.—30% Sodium Phosphate, 10% Lithium Citrate.

Dose.—60 to 120 grains. A diuretic purgative and antilithic.

Lithii Guaiacas, Lithium Guaiacate.

Dose.—5 grains (0·3 Gm.) in pill twice a day.

Prepared by digesting guaiacum resin in solution of lithium oxide, decanting the solution, evaporating, and scaling it. Contains Lithium Oxide 1, Guaiacum Resin 3. For gout and rheumatism.

Lithii Hippuras. $CH_2NH.C_7H_5OCOO.Li$ = 185·012.

Dose.—5 to 20 grains (0·3 to 1·2 Gm.).

In light white minute crystals, soluble in water 1 in 2½, is a powerful solvent of lithates; useful in gout and rheumatism, *cf.* Piperazin. **Vescettes** contain 5 grains. **Effervescent Lithium Hippurate** 5 grains in 1 drachm.

When prepared by neutralising Lithium Carbonate suspended in hot water with hot aqueous solution of Hippuric Acid, Phenolphthalein as indicator; the solution concentrated and the product, twice recrystallised and dried on a porous plate, was found to contain two molecules of water.—C. E. Corfield, B.P. Conf., 1923.

T. Bodley Scott warns against using 20 grain doses of lithium hippurate. It is a safe and sure depressor of arterial tension; 3 or 4 grains of the lithium salt or 6 to 7 grains of the ammonium salt suffice.—Pr. Aug. '12,257, *et seq.*

Lithii Iodidum, Li I = 133·872.

Dose.—1 to 5 grains (0·06 to 0·3 Gm.).

White crystalline deliquescent powder. A salt rich in iodine,—containing 94·7% An antiarthritic and has been employed in syphilis, also in rheumatoid arthritis by iontophoresis, *q.v.*

Umbrenal, a 25% Solution of Lithium Iodide filled in ampoules of 12 Cc. Used as a contrast in pyelographic work.

Lithii Salicylas. $C_6H_4OH.COOLi$=143·98.

Dose.—5 to 20 grains (0·3 to 1·2 Gm.) for rheumatism and gout. A deliquescent white powder *soluble* 1 in 1 of water, forming a neutral or slightly acid solution. *Incompatible* with acids and with Sodium Bicarbonate.

Effervescent Lithium Salicylate contains 1 in 30.

Dose.—1 or 2 drachms.

Lithii Sulphas $Li_2SO_4H_2O$=109·944.

Dose.—5 to 10 grains (0·3 to 0·6 Gm.).

White crystals soluble in Water and Alcohol. Ionic Solubes are prepared for Iontophoresis, *q.v.*

Lithii Tartras Acidus.

CHOH. COOLi. CHOH. COOH, 1½ H_2O = 183·014.

Dose.—5 to 20 grains (0·3 to 1·2 Gm.).

White crystalline powder, used in gouty cases with gum affections.

Lithion is a granulated (non-effervescent) preparation composed of lithium citrate, magnesium sulphate, sodium sulphate, &c. *Dose.*—One-half to one teaspoonful taken in a little warm water.

LOBELIA (*B.P.* '14), U.S., P. Belg.

The dried flowering herb *Lobelia inflata* (*Lobeliaceæ*). Has purgative and emetic properties, but its chief use is to relax spasm of the bronchi in asthma and bronchitis. It is contained in many anti-asthmatic powders (*vide* **Pulvis Lobeliæ Composita**).

Ⓟ **Tinctura Lobeliæ, U.S. X.** 1 in 10 of Alcohol (49% by vol.) *Average dose* 15 minims (1 drachm as emetic). F.I. agreed 1 in 10 Alcohol 70%. Fr. Cx., Max. single dose 30 minims approx., max. during 24 hours 95 minims approx.

Ⓟ **Tinctura Lobeliæ Ætherea** (*B.P.* '14). 1 in 5 Spirit of Ether. *Dose.*—5 to 15 minims until nausea occurs.

In atonic constipation with dryness of the fæces the Tincture in 10 minim doses, combined with Cascara, useful.—H.

Standardisation by its effect on blood pressure and subsequent paralytic action on certain nerve cells is possible.—Dixon, P.J., ii./05,157.

P1 **Lobeline.** $C_{22}H_{27}O_2N$ = 337·224.

(We have taken this formula, having regard to that used in P.G. in describing the Hydrochloride.)

A crystalline Alkaloid obtained from *L. inflata.* A powerful respiratory stimulant, but should be used cautiously in patients with enfeebled myocardium. Probably more effective combined with a cardiac stimulant.

Suggested dose (as a soluble salt) 10 mgr. intravenously (Curtis and Wright). Effects not lasting. Used by Sir Wm. Willcox with beneficial results in case of new growth in chest associated with dyspnœa, and in persistent hiccup. It has been used in coal-gas and Morphine poisoning. Of greater use in respiratory emergency. —B.M.J. ii./26,1226; for pharmacology see F. R. Curtis and S. Wright, L. ii./26,1255-58.

Lobeline used to prevent coma in Morphine poisoning, restore respiration after anæsthesia, and to counteract effects of gas-poisoning. As an antidote after taking 8 Cc. of Tinct. Opii: first 3 mgr. given intravenously, then 10 mgr. hypodermically, then a further 3 mgr. intravenously. Patient recovered. —P.J., ii./26,328.

P1 **Lobelinum Hydrochloricum,** P.G. VI. $C_{22}H_{27}O_2N.HCl$ = 373·689.

Max. dose.—$\frac{1}{3}$ grain (**0·02 Gm.**): *pro die* 1½ grains (**0·1 Gm.**).

1 Cc. ampoules of 1% solution are made. *Solutions must not be heated.*

P1 **Lobelin Ingelheim** has subcutaneous or intramuscular dose for children $\frac{1}{20}$ grain (0·003 Gm.). Subcutaneously $\frac{3}{20}$ grain (0·01 Gm.) for adults. Intravenously for adults $\frac{1}{20}$ to $\frac{3}{20}$ grain (0·003 to 0·01 Gm.) very slowly. —Pres., '27,68, and makers' printed matter.

P1 **Lobeline Sulphate** is also manufactured.

White crystals soluble 1 in 1 (by our experiments, 1927).

Ⓟ **Lobeline Sulphate Tablets,** $\frac{1}{20}$ grain, for hypodermic use as a spinal sedative and relaxant.—P.J. i./26,53.

Patented method of extraction of alkaloids.—Y.B.P., 1922,11.

MAGNESIUM.

Mg = 24·32.

Magnesii Carbonas Levis (*B.P.* '14). $3(MgCO_3),Mg(HO)_2,4H_2O$ = 383·36. (This formula is not given in the B.P.). Is prepared by precipitation of Magnesium Sulphate Solution with Sodium Carbonate. **Magnesii Carbonas Ponderosus,** similarly in more concentrated solution and by boiling and evaporation to dryness, and washing with water to remove Sulphate. *Dose.*—30 to 60 grains, or 5 to 20 grains repeated.

A useful substance for clarifying liquids from suspended matter.

Liquor Magnesii Bicarbonatis (**Carbonatis**) (*B.P.* '14). FLUID MAGNESIA. *Dose.*—1 to 2 ounces (30 to 60 Cc.)

A colourless liquid, containing 10 grains of Magnesium Carbonate in 1 ounce of Carbonic Acid water.

Magnesia Levis and Magnesia Ponderosa (*B.P.* '14). MgO = 40·32. These are prepared from the respective carbonates by exposure to a dull red heat. *Doses* as for carbonates. Antacid, antilithic, diuretic, laxative.

Magnesia should never be prescribed as compressed tablets since they do not dissolve and may form the nucleus of calculi.—Per P.J., 1./25,470.

✱ Bisurated (T.M. 340411) **Magnesia.**—*Dose.*—Half teaspoonful in water after meals. A proprietary article termed 'an Antacid,' in form of a white powder.

Mannich and Leemhuis find it to contain approximately Bismuth Carbonate 8, Sodium Bicarbonate 40, Magnesium Carbonate (probably heavy) 52. —P.J. ii./13,257,563.

Liquor Magnesii Citratis U.S. X. *Limonade Purgative au Citrate de Magnèsie.* FR. CX.

Average daily dose.—12 ounces

Magnesium Carbonate 15, Citric Acid 35, Syrup 60, Potassium Bicarbonate 2·5, Oil of Lemon 0·1, Water *q.s.* to 350.

Limonada Rogé in S. America is similar to FR. CX.—Ph. Notes.

Magnesii Chloridum, $MgCl_2$, $6H_2O$ = 203·33. *Dose.*—30 to 60 grains (2 to 4 Gm.) increased.

Deliquescent crystals, very soluble in water. Mild purgative, a dose in ½ pint of hot water useful for constipation and in dyspepsia and stomach disorders.

War wounds have been treated with 1·2% Solution.

Magnesii Chloras. $Mg(ClO_3)_2$, $6H_2O$ = 299·33.

Deliquescent white crystals made by decomposing the barium salt with Magnesium Sulphate.

Has been used in form of ointment (20%) on epithelioma of the lip.

Magnesii Hydroxidum, $Mg(OH)_2$ = 58·336. MAGNÈSIE HYDRATÉE. FR. CX.

Dose.—5 grains to 2 drachms (0·3 to 8 Gm.).

Prepared by decomposition of Magnesium Sulphate 24½ with Sodium Hydroxide 8 in solution, the precipitate washed free from sulphate and dried at low heat.

According to the FR. CX., calcined magnesia is boiled with 20 to 30 times its weight of distilled water 20 minutes. Dry as much as possible by collecting on calico and finally at 50° C. until it no longer loses weight. Thus prepared, Magnesium Hydroxide contains 31% H_2O.

It dissolves more freely in dilute acids than calcined magnesia. It is a recognised antidote in arsenical poisoning.

✱**Alkagen Tablets** (T.M. 347033). *Dose.*—1 to 3 with water. Contain Magnesium Hydroxide and Peppermint Oil. For acidity, flatulence, etc. It is not open to the objection that Carbonic Acid is liberated as in the case of Carbonates and Bicarbonates.

Pulvis Magnesii Hydroxidi cum Carbone.

Dose.—1 to 2 drachms in a little water after meals.

Magnesium Hydroxide 1, Wood Charcoal 2.

Is suggested in dyspepsia. The Magnesium Hydroxide is antacid and the charcoal has the property of gas absorption. Furthermore, the charcoal would tend to preserve the hydroxide.

A little cinnamon powder (1 in 8) is occasionally added.

Cremor Magnesiæ. MAGNESIA CREAM.

Dose.—1 to 4 drachms in a little water.

A palatable concentrated preparation. Each ounce represents 24 grains of suspended Magnesium Hydroxide. Antacid without evolving Carbon Dioxide—hence no distension is caused.

Uses.—In indigestion, dyspepsia, acidity, rheumatism, and as an alkaline mouth wash, forming a film of Magnesium Hydrate over the tooth surface. A useful antidote in case of poisoning by mineral acids.

Magnesii Lactas.—$(C_2H_4 OH. COO)_2Mg. 3H_2O = 256{\cdot}443$.

Dose.—15 to 60 grains (**1 to 4 Gm.**). White crystalline powder. *Soluble* 1 in 30 of water.

Useful in some cases as a hæmostatic where Calcium Salts do not seem to act. A dose of 30 grains usually reduces time of coagulation of the blood 30%, *e.g.*, from 2 to 1¼ minutes. The salt can be made extemporaneously by the dispenser, if prescribed in a mixture, from Magnesia, with Lactic Acid *q.s.* The large dose of the bulky powder, if ordered in that form, is inconvenient to take. Note.—Magnesium Oxide 1 requires Lactic Acid (75%) about 5 to dissolve it.

Oozing of blood from the gums has been well treated by 40 to 60 grain doses. For erosion of bone, due to scurvy, this and the Calcium Salt are valuable.—Sir A. E. Wright.

✱**Neolyse** (T.M. 415231). A preparation of Silico-Magnesium salts. It has been advocated for the palliative treatment of malignant disease. Magnesium salts, it is thought, tend to destroy superficial cancerous growths, and they give encouraging results in inoperable cancers. Where the drinking water has a marked content of Magnesia salts, cancer is said to be rare. Magnesia and Silica, perhaps, play the same part in cancer that Lime does in tuberculosis. Lengthy treatment would be required. The Silica compound would be slowly eliminated.

Cachets of Neolyse. *Dose.*—1 cachet thrice daily before meals for 20 days, then interrupt treatment for 10 days, and continue until the desired result is obtained.

Neolyse injections and **Compresses for local use** are prepared.

Magnesii Sulphas. FR. SEL ANGLAIS or SEL D'ANGLETERRE.

$MgSO_4.7H_2O = 246{\cdot}496$.

Dose.—2 to 4 drachms or 30 to 90 grains repeated (*B.P.* '14).

Soluble 10 in 13 of water—measuring 18·5. *Incompatible* with Soda Tartarata and Alkaline Carbonates.

Flavoring.—Glyl Menthæ Piperitæ, Glyl Cinnamomi.

Solutions kept ready for dispensing should be sterilised; this will effectually prevent the fungoid growth which occasionally occurs.

Uses.—Largely employed as an efficient evacuant.

Dysentery in South Africa was treated by the "Evacuant Method" —Magnesium and Sodium Sulphates, Castor Oil, Calomel, also with Ipecacuanha Powder.

This salt does not act by attracting fluid into the intestine, since the watery stool following ingestion contains none of the salt. This is passed in the solid stool on the following day. It is suggested that its purgative action depends upon a duodeno-colic reflex analogous to the similar but less painful reflex produced by food.—M.P.C., July, 14, '26.

Injected subcutaneously in small doses (5-10 grains) Magnesium Sulphate produces a cathartic action.—Dixon, p. 265.

Intraspinal Anæsthesia has been induced by injecting Magnesium Sulphate in dilute solution.

TETANUS has been treated by spinal, intracerebral and subcutaneous injection—the usual dose being 1 to 5 Cc. of 25% solution. Calcium Chloride is an antidote to Magnesium Sulphate—an injection of 5 Cc. of 5% solution counteracts the effects almost instantaneously. The method was not found of service by our W.O. authorities. Intraspinally it is an anticonvulsant, but it may be better to use dilute solution in large amounts—a pint to a quart of 1 to 2% solution at intervals by hypodermoclysis.

CHOREA treated by 1 to 5 Cc. of 25% Solution of the *pure* salt. Weaker Solution, *e.g.*, 7·3%, which is isotonic with the cerebro-spinal fluid, was, however, advised—of this 3·4 Cc. = 1 Cc. of the 25%. See also M.P.C., Oct. ii./22, 303.

EPILEPSY.—1 Cc. of 1 in 5 Solution or 1 Cc. of 1 in 2 Magnesium Chloride hypodermically has been used.

EPIDEMIC ENCEPHALITIS greatly benefited by Magnesium Sulphate, 4 Cc. of a 25% solution, intramuscularly.—E. Matthew, L. i. /24,1156.

ECLAMPSIA, Suppression of the convulsions in.—Intrathecal injections of 25% Magnesium Sulphate Solution, allowing 1 Cc. for every 25lbs. (approx.). —L. ii./12,1575.

ECLAMPSIA.—***Intravenously,*** 10 to 25 Cc. of a 10% solution, gave good results. Convulsions controlled, œdema reduced and diuresis promoted.—Am. Jl. Obstet. and Gynec., Feb.'25. See also H. Pritchard, B.M.J. i./28,794.

In acute articular RHEUMATISM and in gonorrhœal epididymitis, orchitis, gonorrhœal rheumatism, neuritis, also in erysipelas and cellulitis, and in general for the relief of pain associated with local inflammation, local application of a hot saturated solution in 10 to 15 layers of gauze or a thin layer of Absorbent Cotton or Lint applied around the limb or on the face has given extraordinary results. Action is empirical—not due to osmosis.—L.i./11,300.

In RHEUMATISM injected into the buttock and infra-scapular region. *Dose* —4 Cc. of 25% Solution daily for the first three or four days and then alternate days.—P.J. i./12,124. 3 grain doses hypodermically purge and relieve.—L. ii./11,481.

SCALDS AND BURNS well treated by a concentrated (25% and over) solution. S. J. Meltzer, Jl. Pharm. & Exp. Therap., Nov., 1918.

HYPOPYON ULCERS treated with Magnesium Sulphate Lotion—up to saturated solution. Encouraging.—D. Matheson Mackay, B.M.J. ii./21,738. See also M. Kirkpatrick, per T. D. B., Aug. 15, 1921, p. 83.

As a SEDATIVE IN MENTAL CASES. 2 Cc. of 50% solution injected. In 82·7% of cases the action was prompt, the patient becoming quiet in 13 to 30 minutes and then sleeping from 5 to 7 hours.—M.P.C. i./23,291.

RODENT ULCER of the face healed after 5 injections of Magnesium Sulphate. —R. W. Moir, per Pres., June, '23,237.

A solution of 35 grains to the ounce useful as lotion in lymphangitis, erysipelas, cellulitis, orchitis, epididymitis and all vague œdemas and swellings.—B.M.J. i./16,400.

TROPICAL ULCER treated with wet dressings of Magnesium Sulphate 25% solution.—J. F. James, I.M.G., June, '25,274.

Poisoning by Magnesium Sulphate.—

Seven cases in all are reported since 1841. In the particular case reported here subcutaneous injections of Saline into tissues of axilla gave relief, also Calomel ½ grain every hour until bowels opened and recovery.—L.i./09,1174.

Magnesium Sulphate Cream.

Mix together exsiccated Magnesium Sulphate 1½ lbs. with 11 ounces of

Glycerole of Carbolic Acid (1 in 10) in a hot mortar to make a cream. (The carbolic acid may, however, be omitted.) Pack and thickly cover the wound with the cream. The dressing of gauze and wool is left unchanged for 3 to 8 days. Profuse discharge of serum takes place, so that more wool may be wanted. After a few dressings like this Magnesium Sulphate *solution* is used. **Good osmotic action and inhibitory effect on the aerobic and anaerobic organisms.**—A. E. Morison, B.M.J. i./18,342.

As a Granular Effervescent preparation, *Dose.*—½ to 1 ounce (**15 to 30 Gm.**), or 1 to 3 drachms (**4 to 12 Gm.**) repeated, Magnesium Sulphate is frequently more effective, and more palatable.

'Vescettes' of Magnesium Sulphate, each containing 30 grains. To be crushed and dissolved in a small draught of warm water.

Mistura Alba. *Dose.*—½ to 2 ounces

Magnesium Sulphate 30 grains, Magnesium Carbonate 15 grains, and Peppermint Water 1 ounce. A mild aperient.

Magnesii Sulphas Exsiccatus.—If crystallised Magnesium Sulphate be heated at 100° C. it will lose 37—40% moisture. It is a fine white powder without odour with a saline bitter taste, giving a warm sensation to the tongue due to its recombining with water Almost completely soluble in water. Aqueous solution (1 in 40) should be neutral to litmus paper.

Enema Magnesii Sulphatis. ½ to 2 ounces in ½ to 1 pint of water.

Magnesii Sulphis, *v.* p. 93.

Grignard Reaction, Mechanism of.—J.C.S.A. i./20,30.

MALTUM.

Maltum. Grain of barley partially germinated artificially and then dried. Yields 70% extract. The acidity calculated as lactic acid should not exceed 0·3%. It should not contain more than 1/100 grain Arsenic, calculated as Arsenious Oxide, to the pound.

Malti Pulvis. *Dose.*—1 to 2 drachms (**4 to 8 Gm.**).

Malt flour or entire malt powdered, is added to baked wheaten flour in various proportions to form the popular infants' foods, and is given to assist digestion. When these are mixed with hot water or a mixture of hot milk and water, the starch contained in the wheaten flour becomes soluble and digested into dextrin and malt sugar. The diastasic property of malt is most acute in aqueous solution at 104° F.,—a boiling heat destroys it. A small teaspoonful of malt flour may be sprinkled over or mixed with cooked farinaceous foods,coffee,beer,&c.

Diastase. Obtained by exhausting malt with tepid water, precipitating with alcohol, and drying at below 45° C. Is a yellowish white powder or in translucent scales. According to Fr. Cx. diastase converts 100 times its weight of starch into sugar and dextrin. Its use is indicated by the presence of starch grains in the fæces or urine.

Extractum Malti.—*Syn.* EXTRACTUM BYNES, Extrait d'Orges. *Dose.*—1 to 4 drachms.

A brownish semi-liquid substance Sp. Gr. about 1·400, with pleasant sweet taste, consisting principally of maltose (about 50%), with dextrin, dextrose, diastase, proteid, phosphates and aromatic principles. It is made by mixing malt with tepid water (55° C., *i.e.*,131°F.), pressing, filtering, and evaporating *in vacuo* at below 55° C. Extract of Malt and its preparations are prescribed in cases of debility of all kinds, as a restorative, like cod liver oil, but particularly where digestion is weak. It should digest twice its weight of arrowroot starch in 30 minutes at 40° C. (B.P.C., 1901). *Further on assay and adulterants, Vol. II.*

Incompatibility. A few years ago we determined the compatibility or incompatibility of numerous Soluble Chemicals with Malt Diastase. Broadly speaking, the following are incompatible: Acids, various Inorganic and Organic, also Acid Preparations, Ferric Chloride, Pepsin Preparations, Potassium Permanganate. In *Vol. II.* we provide further details. *cf. also* 'ENZYME ACTION.' A mixture of Hydrogen Peroxide and Ferrous Sulphate can liquefy starch similarly to an enzyme.—C.D. ii./13,851.

***Radio-Malt.** (T.M. 468864). A Malt Extract preparation to replace Cod Liver Oil containing Vitamins A, B and D, the latter in the form of ***Radiostol** (T.M. 477932) produced by irradiating Ergosterol with ultra-violet rays. (See also Radiostoleum and Radiomulsin p. 597.)

The Vitamin content of the preparation is stated to be greater than that of Cod Liver Oil and Malt Extract, and to be standardised physiologically. It is agreeable in flavour, while the Cod Liver Oil preparation is objected to by many.

The undiluted Radiostol possesses 200,000 times the antirachitic activity of Cod Liver Oil, one sixth of an ounce equalling a ton.

***Maltaffin.** (T.M. 355917)—*Martindale.*

Dose.—One to two teaspoonsful at bedtime. Children, half to one teaspoonful, increased if necessary.

A combination of Liquid Hydrocarbon Oil with Malt Extract as an electuary. Suitable for children. The oily taste is largely masked.

Maltaffin is also made with **Hypophosphites**, with **Cascara**, with **Iron**, with **Glycerophosphates**, and with **Quinine and Strychnine.**

***Maltine** (T.M. 15025 & 40301) is a Trade Mark Brand of Malt Extract. **Malt Diastase** (*antea*) in France is called Maltine.

Cream of Malt is a special preparation. It is supplied 'plain,' with Cascara, with Cod Liver Oil, with Cod Liver Oil and Hypophosphites, with Creosote, Dialysed Iron, Ⓟ Easton's Syrup, &c.

***Diamalt** (T.M. 296716, Cl. 42) is stated to have diastasic power 1060—(1392 elsewhere)—higher than many of the Malt Extracts on the market.

Digested seven times its weight of starch at body temperature.—L. i./09,551.

***Diamalt with Cod Liver Oil** contains 15 and 33⅓% 'Oil' and Extract.

***Diaparaffin.** (T.M. 354317). *Dose.*—1 or 2 (children ½ to 1) tablespoonsful. A palatable combination of Diamalt and Paraffin. An efficient laxative in dry powder form. It contains 28·2% Liquid Paraffin.—L. i./14,41.

PATENTS: See 13,928/1913 and 26,390/1913; also 29,481/1912.

Extractum Malti Liquidum.

Dose.—1 to 4 drachms (**4 to 15 Cc.**).

In place of evaporating malt infusion to the viscosity of the solid extract, if it be concentrated *in vacuo* to prevent decomposition of the ferment diastase until it has Sp. Gr. 1·375, and about 7% of alcohol added, making the finished product of Sp. Gr. 1·250, a liquid extract is formed which is more convenient.

Glycerin is added; Alcohol only precipitates the diastase, also a small quantity of Formaldehyde as preservative.—P.J. ii./07,732.

***Bynin** (T.M. 41136). A commercial brand of Liquid Malt Ext.

Ⓟ ***Bynin Amara.** *Dose.*—2 to 4 drachms well diluted.

Contains Quinine Phosphate 1½ grains, Iron Phosphate 2 grains, Strychnine Phosphate $\frac{1}{16}$ grain, in liquid malt extract (Bynin) 1 ounce. It is $\frac{1}{4}$ the strength of Easton's Syrup.

Extractum Malti cum Hypophosphitibus.

Dose.—1 to 4 drachms (4 to 15 Cc.). Dissolve Calcium Hypophosphite 0·5 in water 4, and Sodium Hypophosphite 0·5 in water 1, then add Liquid Extract of Malt *q.s.* to 100.

Extractum Malti cum Hypophosphitibus cum Oleo Morrhuæ.

Dose.—1 to 4 drachms (4 to 15 Cc.). Contains Calcium Hypophosphite and Sodium Hypophosphite of each 0·5, Cod Liver Oil 15 and Liquid Malt Extract *q.s.* to 100. Label this 'Shake the bottle.'

Extractum Malti cum Cascara.

Dose.—1 to 4 drachms (4 to 15 Cc.). Liquid Extract of Cascara 1, Liquid Extract of Malt 7. This is palatable. Mix and mark 'Shake.'

Extractum Malti Ferratum, G. H., E.

Iron Pyrophosphate 2, Water 3. Dissolve and add Extract of Malt 95. *Dose.*—1 to 4 drachms (4 to 15 Gm.).

Extractum Malti cum Hæmoglobin.

Dose.—1 to 4 drachms (4 to 15 Cc.).—Hæmoglobin 1, Liquid Extract of Malt 7. Mix and mark 'Shake.'

Extractum Malti cum Syrupo Ferri Phosphatis. *Syn.* MALTOFERROSE. *Dose.*—1 to 4 drachms (4 to 15 Cc.).

Each drachm contains: Phosphates of Iron $\frac{1}{2}$ grain, and of Calcium $\frac{1}{2}$ grain, with $\frac{1}{4}$ grain each of Sodium and Potassium Phosphates.

Extractum Malti cum Oleo Morrhuæ. *Dose.*—1 to 4 drachms. This preparation should contain at least 15% Cod Liver Oil.

Extractum Malti cum Pancreatina. *Dose.*—1 to 4 drachms (4 to 15 Cc.). Liquid Extract of Malt 2, Pancreatic Solution 1.

We find this produces a perfectly clear solution without any deposit: on the other hand, made with Pancreatin 2, Glycerin 10, and Liquid Extract of Malt to 100, the result was not satisfactory. Assists digestion of farinaceous food.

✱Bronamalt (T.M. 349714, Cl. 42) (previously known as Vibrona Malt).

Dose.—1 to 2 drachms with or immediately after meals.

Described as a tonic food. A combination of a hydrobromic Extract of Cinchona with a liquid Malt. In cases of impaired nutrition and loss of appetite, especially in children.

✱Lacto Maltine (T.M. 156408 Class 42).

Dose.—One dessert-spoonful after meals in tea, coffee, milk, wine or farinaceous food.

A preparation rich in milk-fat, easily digested. The diastasic ferment acts as an adjunct where there is feeble carbohydrate digestion.

Extractum Malti Siccum.

Contains about 75% Maltose, 1·5% Phosphates, 5% Albuminoids. *Dose.*—1 to 2 drachms.

A somewhat hygroscopic yellowish coarse powder, easily soluble in water. Is desiccated carefully *in vacuo* and hence keeps well.

In some experiments, we found British Dried Malt Extract to be more active than foreign, but not quite so active as Extractum Malti.

Dry Malt Extract with 50% Paraffin.

Dose.—Infants, one teaspoonful dissolved in slightly warmed milk feed three times a day. Children, two teaspoonfuls two or three times a day. Adults, one tablespoonful three or four times daily. Best taken just before or after meals.

This has the appearance of a crystalline compound. It emulsifies with water.—L. i. 15,918.

Taka Diastase. *Dose.*—1 to 5 grains (**0·06 to 0·3 Gm.**).

A whitish powder obtained by the cultivation of a fungus, *Eurotium Oryzæ*, on bran ; possesses amylolytic properties.

Useful for gouty dyspepsia and hyperacidity of the stomach.

Taka Diastase in 5 grain Capsules after each meal and at bed-time improves diabetes mellitus,—amount of urine and sugar content lessened.—L. i./11,826.

Mead's Dextri-Maltose. A powder containing 51% Maltose, 42% Dextrin and 5% Water and at choice, salt free, or containing 2% Sodium Chloride or Potassium Bicarbonate 3%. No. 1 (with salt) is for infant feeding, No. 3 (with Potassium Bicarbonate) for infants who suffer from constipation. No. 2 (salt free) for use by practitioners who prefer to make their own salt additions.—L. ii./22,520.

MANGANESIUM. (*See also* p. 374).

Mn = 54·93.

Manganesii Butyras. $Mn\ [C_3H_7COO]_2 = 229·042$.

Dose.—1 to 1·5 Cc. of 1% solution intramuscularly—not more than 3 injections should be given with 3 or 4 days' clear interval between them.

Preparation.—Manganese Butyrate is precipitated as a heavy oily liquid by interaction of solutions of Sodium Butyrate and Manganese Chloride. This oil is washed with water, dried over Sulphuric Acid, and then washed with Ether to remove free butyric acid. The product is again dried over Sulphuric Acid for some days, and powdered.

Characters. Pale pink powder having only a slight odour of Butyric Acid. Dissolves in about 6 parts of cold water. The substance is hydrolised by boiling water with deposition of Manganese Hydroxide.—According to our experiments, 1923.

Uses.—Boils, carbuncles, erysipelas, whitlows, lymphangitis, lymphadenitis, gonococcal urethritis and abscess formation said to be well treated by Manganese Butyrate Solution (1%).

Should be used prior to making incisions in septic lesions. Two injections should cause the lesion to abort if no pus has formed and if pus has formed, the part will come to a head ; then use a dry dressing.—M.P.C., Dec. 20/22.

In gonorrhœa, the drug 'par excellence.' Intramuscularly into the buttocks on the first and fifth day of the discharge, in doses of 1 Cc. and 1·5 Cc. of 1% solution. Results extremely gratifying, the acute stage of the disease being materially lessened. Only two injections should be given.—J. J. Abraham, L. i./24,1224.

Staphylococcal and Streptococcal infections better treated than gonorrhœal. It will ward off an attack of rhinitis, influenza, and other infections, providing it is used early. Also used in dermatitis, asthma, and urticaria.—*See also* J. E. R. McDonagh, B.M.J. i./25,655.

VASCULAR HYPERTENSION AND HYPOTENSION.—Hypertension and hypotension are stated to be caused by changes in the nature of the protein particles of the plasma.

Hypertension is a result of the protein particles leaving the colloidal state and forming true solutions, and is found in cases of chemical intoxication, in some cases of syphilis and diabetes, in pregnancy and at the menopause, and is the natural sequence of old age. The best remedy for acute cases is the injection of 1% Manganese Butyrate solution in doses of 1·0, 1·5, 2·0 Cc. at five day intervals. In chronic cases, Insulin 20 units is a suitable drug. With all these methods the course may have to be repeated.—J. E. R. McDonagh, M.P.C., Jan. 23 & 30/1924.

For a further abst. of this paper *re* hypotension see Adrenalin and Testicular Extract.

Manganese Butyrate Sterules. 1, 1·5 and 2 Cc. of 1% solution are made.

Trimine. *Dose.*—8 to 15 minims (0·5 to 1 Cc.). A Colloidal Manganese containing Colloidal Iron and a trace of Colloidal Zinc in addition. Advised in conjunction with Colloidal Palladium in treatment of gonorrhœa and complications.—J. E. R. McDonagh, Pr. January 1920.

Manganesii Citras, 'Soluble.' *Dose.*—3 to 5 grains (0·2 to 0·3 Gm.).

This, a double salt with Sodium Citrate, and **Ferro-Manganese Phosphate**—*Dose.*— 3 to 10 grains (0·2 to 0·6 Gm.)—are scale preparations.

Manganesii Hypophosphis, $MnP_2H_4O_4+H_2O=203·032$. *Dose.*—1 to 10 grains (0·06 to 0·6 Gm.).

A white or slightly rose-tinted powder, soluble 1 in 10 of water. A nerve stimulant.

Manganesii Oxidum Præcipitatum.

Dose.—3 to 10 grains (0·2 to 0·6 Gm.), or more, in pills with syrup. Tablets, 2 grains (0·12 Gm.).

Manufactured from Manganese Sulphate by action of Ammonia and Hydrogen Peroxide.

Consists principally of manganese di-oxide $MnO_2=86·83$, a bulky blackish brown powder, free from grittiness and entirely soluble in cold hydrochloric acid.

Uses.—In gastrodynia, pyrosis, and in amenorrhœa taken 3 or 4 times a day before expected period. In chlorosis it assists the action of iron salts, and is less irritant than the permanganates.

Manganesii Phosphas, $Mn_3P_2O_8.7H_2O = 480·956$.

Dose.—1 to 5 grains (0·06 to 0·3 Gm.).

A white powder, generally with a pinkish tint, insoluble in water. From ½ to 1 grain is given in 1 drachm of syrup of ferrous phosphate.

Manganesii Sulphas, $MnSO_4+4H_2O=223·058$.

Dose, of powder, 2 to 10 grains (0·12 to 0·6 Gm.).

A white powder with a faint pink tint, due to a little manganic sulphate, or in pink crystals. ***Soluble*** about 1 in 1½ water. For jaundice 60 grains is a cholagogue purgative; not reliable, may cause sickness.

Potassii Permanganas. $K_2Mn_2O_8=316·052$. (*B.P.* '14.)

Dose.—1 to 3 grains (0·06 to 0·2 Gm.) in well-diluted solution, or in pill. **Capsules** contain 1 grain (0·06 Gm.).

Manufacture.—May be prepared by oxidising manganese dioxide by the aid of potassium chlorate in the presence of potassium hydroxide. Electrochemical method. By oxidation of the Manganate in an electrolyser. Surrounding the anode is a solution of Alkali and round the cathode is a solution obtained by lixiviating the melt of Manganese Dioxide and Potassium Hydroxide (Manganate). Dichromates, Perchlorates and Persulphates can be made similarly.—P.J. i./16,3.

Incompatible with all vegetable oxidisable matter, *e.g.*, glycerin, alcohol, sugar, fats and oils, with ammonia, ammonium salts and alkaloids.

Poisoning by 15 to 20 Gm. dissolved in water: was treated both by lavage and internally with a cardiac tonic—a digitalis preparation and also with Magnesia as the presence of hydrochloric acid was alleged. The Potassium had probably produced the toxic symptoms on the heart. *Recovery.*—L. ii./11,907.

Uses.—The **Saturated Solution** (1 in 20 of water) is strongly bactericidal, as a disinfectant its colour is an advantage. Even 1 in 1,000 is efficient, *cf.* Vol. II. It is a good deodoriser.

A dilute solution will dye white hair to a chestnut brown, but this cannot be advised.

In AMENORRHŒA, 1 or 2 grains, in a pill 3 or 4 times a day should be given for a few days before the time of the expected period.

For GONORRHŒA 1 in 10,000 to 1 in 1,000 is used as a warm irrigation or injection.

Injectio Potassii Permanganatis, L.H., has 5 grains in 1 pint, *i.e.* 1 in 1,600 in round numbers.

It is as good (1 in 1,000 solution) as silver preparations. In place of injection, irrigation (JANET'S METHOD) is often used. In cases seen early before acute inflammatory symptoms and purulent discharges have appeared, abortive treatment is sometimes successful, but not likely to succeed after 24 hours. This consists of irrigation of the anterior part of the urethra with this solution.—C. F. Marshall.

Irrigation with Permanganate for gonorrhœa in the War—no definite strength adhered to, as the urethra gradually acquires toleration to it.—E. T. Burke, L. i./17,756.

Thyroid and Manganese Treatment in Acute Pneumonia. ACUTE INFECTIONS, JOINT DISEASES, HEART DISEASE, ABNORMAL BLOOD PRESSURE, DISEASES OF PREGNANCY, DISORDERS OF METABOLISM, DIGESTIVE TROUBLES, NERVE COMPLAINTS, PULMONARY DISEASES, DISEASES OF THE SKIN, GOITRE AND MYXŒDEMA, DISEASE OF THE BREAST, ETC., treated by rectal injections of Potassium Permanganate 1 grain in 1½ pints of sterile warm water. The amount is varied according to case, e.g., 2 doses of ¼ pint may be found more effective than 1 dose of ½ pint. Warn patients they may feel some pain in the epigastrium within a few minutes, also they may pass long white skins or strings of mucus in the stools. **Thyroid** is given simultaneously—1 grain twice daily, but doses of 6½ grains or 5 or 10 grains are in some cases desirable. Sometimes the Permanganate may be used *per os*, in cachet, followed by a large draught of water, but this is not so good.—H. W. Nott, B.M.J., i./25,443; ii./25,1209.

PNEUMONIA.—Remarkable results. It is suggested that Permanganate may be a specific. Treatment consists in rectal injections of 3-10 ounces of a Potassium Permanganate solution (4 grains in 3 pints) every 2 or 4 hours. —H. W. Nott, B.M.J., ii./26,109.

Value of treatment confirmed in 5 consecutive cases of acute pneumonia.—N. J. Roche, B.M.J., i./27,459. *See also* B.M.J., i./27,539.

The distribution of Manganese in the animal and in foods. The combination of Thyroid with Manganese may have a physiological basis of much significance.—B.M.J., i./25,468.

Further discussion on the effect of Permanganate. A point regarding casts caused by action of the alkali formed.—J. S. Kellett Smith, B.M.J., i./25,678.

A combined cachet of Potassium Permanganate and Thyroid gives effects in cases of neurasthenia accompanied by low blood pressure, not obtained by giving the two separately. The Thyroxin is probably not destroyed by the Permanganate in this way. The therapeutic effect may be due to a new substance produced by the reaction of the two.—J. T. Blackie, P.J. i./26,231; C.D., i./26,306.

GONORRHŒAL CONJUNCTIVITIS in the adult treated by prolonged unintermittent stream of 1 in 15,000 to 1 in 20,000 solution.—L. i./12,91.

Gargle, Mouth Wash, or Vaginal Injection 1 of Potassium Permanganate in 5,000 of water is useful.

The solution is very nauseous to the taste. Useful for applying to foul ulcers and patches of gangrene, and to carbuncles as mild caustic.

BROMIDROSIS.—Wash the feet first in benzene, then in 1% permanganate (at night). Powder (during the day) with Potassium Permanganate 13, Alum 1, Talc 50, Zinc Oxide 18, Zinc Chloride 18. Bath of borax and benzoin also useful.

OFFENSIVE BREATH.—1 or 2 grains in a glass of soda water taken on an empty stomach is a certain cure.

An OZŒNA spray of the Liquor 5 minims with Sodium Chloride 5 grains to the ounce of water is useful.—H. Tilley.

VOMITING OF PREGNANCY has been treated by 2 to 4 grains Potassium Permanganate in a cachet, giving immediately afterwards 3 to 4 ounces of water. Patient keeps this in the stomach 10 to 20 minutes—lying very still—then a pint or more of warm water. If necessary a further 1 grain of Permanganate per hour.

TUBERCULOUS FISTULÆ and dactylitis have been treated by packing with the crystals twice a week.

TUBERCULOUS ULCERS yield to potassium permanganate 1 drachm to the ounce, followed by Starch Iodide.

Isolated LUPUS nodules have been treated by applying saturated solution or by boring holes with wooden skewer, filling with permanganate and moistening the surface with water and repeating a few hours later, using novocain and adrenalin.

SLOUGHING and TETANUS-INFECTED WOUNDS, according to Sir Leonard Rogers, may be well treated with not less than 1 in 500 Potassium Permanganate Solution. Worthy of trial in the field for irrigating all earth and dust infected wounds.—B.M.J., Dec. 19,14.

CHOLERA treated by 2 grains of Potassium Permanganate every ¼ hour for 2 hours, then 1 pill every ½ hour. These are continued until the stools become green and less copious—this is usually attained in 12 to 24 hours. A weak solution (1 to 6 grains per pint) of Calcium Permanganate is allowed as a drink. 50 grains of permanganates by the mouth in 24 hours have been given without harm, and even larger doses would probably be tolerated—in addition hypertonic saline injections (*q.v.*).—B.M.J. i./11,760. **Rectal Injections** 4 grains to the pint have also been used.

ASYLUM DYSENTERY.—A solution of Permanganate, 1 grain in 20 ounces, is used. The patient swallows ½ to 1 or 2 ounces several times a day. In urgent cases, 20 m. approx. injected deeply into the buttocks—results often remarkable.—W. J. A. Erskine, B.M.J., i./25,530.

Also of great value in the blae type of young women—florid, not anæmic, readily tired—pulverettes 2 gr., three times a day after meals.—E. K. Mackenzie, B.M.J., i./25,530.

War wounds have been treated by the powdered permanganate.

The immediate application of a solution of Permanganate 1 in 1,000 will prevent the occurrence of VENEREAL DISEASE. The knowledge might undermine the moral fibre of the nation.'—H. Wansey Bayley, B.M.J. i./21,33. Its evils, *ibid* 66.

STYPTIC FOR SEROUS SURFACES.—In cases of hæmorrhage from superficial wounds of these surfaces after separation at adhesions, a few crystals applied in a fold of lint—or muslin—with forceps causes blood coagulation. Bleeding stops at once. Oxygen is evolved.—J. Dsirne, L. i./21,1380.

SMALLPOX.—Potassium Permanganate in saturated solution (5%), useful for painting the body. If skin sensitive, use 1·5%. In confluent cases patient put in a bath of this 5% solution, at body temperature, for 10 minutes. Reduces smell and sloughing.—L. ii./22,1193.

Epidermophytosis, intertrigo, ECZEMA MARGINATUM and eczematoid ringworm well treated by solution 1 in 5,000 gradually increased.—S. Feldman and B. F. Ochs, per Jl. Trop. Med., June 1/23,198.

DERMATITIS among painters, following use of paint solvents, cured in 10 days by 1 : 1,000 solution Potassium Permanganate.—J. A. Turner, Jl. Indust. Hyg., July '25,293; per Pres., Oct. '26,351.

PYODERMIA well treated with baths containing Potassium Permanganate, Copper or Zinc Sulphate, or Sublimate.—B.M.J.E., ii./25,80.

VARICELLA treated by Potassium Permanganate baths, 5 to 6 Gm. for an adult or half the amount for children.—B.M.J.E., ii./25,80.

Snake bite lancets (Brunton's) are prepared containing the crystals.

Directions.—Squeeze the part so as to press out the venom, then cut with the lancet, making several incisions deeper than the bite, and rub in the dry crystals thoroughly, moistening with water if necessary Tie a ligature or handkerchief between the bite and the heart as soon as possible to prevent the venom getting into the circulatory system. Equally good in all kinds of snake bite.

If a tube of ethyl chloride is at hand spray the part whilst making incisions Scorpion stings are best treated by ammonia or an evaporating lotion to the affected part, also Potassium Permanganate as in snake bite.—L. Brunton, L. ii./15,200.

SCORPION STINGS treated by a few drops of strong Potassium Permanganate solution injected round about the part.—A. S. Gubb, B.M.J. i./23,41.

A case of Adder Bite, treated with Potassium Permanganate Crystals, hot rectal injections of Normal Saline, hypodermic of Strychnine and 10 Cc. of Normal Horse Serum thrice daily—recovery.—B.M.J. i./12,420.

Bougies of Potassium Permanganate contain ½ grain (**0.03 Gm.**) in Theobroma Oil basis, 4 inches long.

Pilula Potassii Permanganatis. 1, 2, 3, 4 or 5 grains with Kaolin Ointment, *q.s.*

Caution! Avoid mixing any easily oxidised substance, like sugar, glycerin, &c. The pills may be coated with sandarach solution.

Tablets contain 1, 2 and 3 grains. To be dissolved.

'**Solubes**' 5 grains for preparing lotions and vaginal injections; to be dissolved in ½ a pint or more of water.

Lotion 'Sterules' of Potassium Permanganate contain 8·75 grains. 1 diluted to 1 pint produces a 1 in 1,000 solution.

Permanganate Tablets for purifying Drinking Water. (Laurent's).

To each litre of water add Potassium Permanganate 0·03 Gm. and Powdered Alum 0·06 Gm. After standing 5 minutes, if the solution is not pink add another tablet or two. Remove excess of Permanganate by Sodium Hyposulphite 0·03 Gm. and dried Sodium Carbonate 0·06 Gm. After 10 minutes pass through cotton wool. Ingredients may be in tablet form.—P.J. i./15,124.

Calcii Permanganas. $Ca(MnO_4)_2+5H_2O=368{\cdot}01$.

Dose.—¼ grain (**0·016 Gm.**) in **Pills** or **Capsules** (with Liquid Paraffin as vehicle) thrice daily one hour before meals.

Deliquescent crimson crystals preferred for making mouth lotions, as it has less taste than the Potassium Salt. 1 in 100,000 sterilises water in 5 minutes; more powerful than the latter.

Uses.—Similar to the Potash Salt, *e.g.*, in cholera. Has been given in rodent ulcer, gastric ulcer and gastritis.

Calcium Lactate and Iodide found most effective in removing warts from the hands—put down to an alteration in the constitution of the blood produced by Calcium salts, as found previously by the same authority in case of chilblains and chronic ulcers. The next step (to find if possible some cure for rodent ulcer), was an inspection of the Periodic Law Table and lead to Manganese. The use of Calcium Permanganate resulted in disappearance of ulcers in several cases and greatly improved a bad case, removing offensive odour.—G. Arbour Stephens.

Sodii Permanganas.

$Na_2Mn_2O_8=283{\cdot}854$. In solution, red in colour, is used as a cheap disinfectant. ✱**Condy's Red Fluid** (Condy's & Condy's Fluid and Condy's Fluid Co. are covered by a large number of Trade Marks, Class 2) is stated to be a mixture of the sulphate and permanganate of soda.—H. R. Kenwood, L. i./26,1055. ✱**Condy's Green Fluid** has Sodium Manganate $Na_2MnO_4=164{\cdot}924$ in solution.

Zinci Permanganas.

$Zn(MnO_4)_2+2H_2O = 339{\cdot}272$. Deliquescent brown crystals; for lotions and injections, 1 grain in 8 ounces (1 in 4,000), where the astringent action of the zinc is indicated. As an eye wash 1 in 1,000 to 1 in 2,000. **Injectio Zinci Permanganatis, L.H.** (Urethral). Has ½ grain in 3 ounces (1 in 2,625).

For gonorrhœa excellent.—Campbell Williams.

For pyorrhœa alveolaris and oral sepsis as mouth wash it is very useful.

'Collapsubes' with catheter attachment, of Zinc Permanganate in Soft Paraffin; strength 1 in 2,000 for use in chronic gonorrhœa.

Zinc Permanganate Bougies, 4 inches long, containing ½ grain (0·03 Gm.) in Theobroma Oil basis are prepared.

MANGANESE POISONING—cases described.—per Clin. Jl., May 16/23,233. Poisoning due to inhalation of dust while grinding the ore.—R. F. Gayle, Jl. A.M.A., ii./25,2008.

MENTHOL.

METHYL-PROPYL-PHENOL HEXAHYDRIDE. $C_{10}H_{20}O = 158{\cdot}16$

Dose.—½ to 2 grains (0·03 to 0·12 Gm.) or more in a pill with powdered soap, or in solution in olive oil.

A white crystalline substance deposited on cooling **Oil of Peppermint** *q.v.* Obtained from *Mentha arvensis, vars. piperascens et glabrata*, and *M. piperita* (*Labiatæ*), it melts at 42 to 43° C.

Soluble 5 in 1 of 90% Alcohol, also in Ether 2 in 1, Chloroform 4 in 1 approximately, 1 in 4 of Olive Oil, and in Petroleum Spirit 10 in 7. Sparingly soluble in water, insoluble in glycerin. Soluble on warming in a strong solution of Sodium Salicylate, but throws out again.

Uses.—Given internally, it acts as a diffusible stimulant. Of value in the vomiting of pregnancy and other forms. Its solutions, applied to the skin, affect the nerves of the part somewhat like aconite, and form useful pigments for headache, rheumatic pains and neuralgia. It has antiseptic and anæsthetic properties, and gives great relief in prurigo, urticaria and pruritus ani. It liquefies when gently rubbed on the painful part.

As an antineuralgic in toothache and for sciatica 1 in 60 of Alcohol with a little Clove Oil, is employed; also Menthol Cones. The crystals on cotton wool may be placed in the hollow of an aching tooth.

Caution.—It is dangerous to apply an ointment containing Menthol to the nostrils of infants, *e.g.*, for treatment of catarrh,—may cause instant collapse.—*Cf.* Camphor.

Menthol liquefies with an equal amount of either Carbolic Acid, Chloral Hydrate or Thymol, also 3 parts of Menthol and 2 parts of Camphor, 2 parts of Menthol and 1 part of Butyl Chloral Hydrate, and 2 parts of Menthol, with 1 of each Phenol and Butyl Chloral Hydrate. These will relieve toothache. Its Camphor and Phenol combinations are used to medicate **oro-nasal 'Ozonic'** and the **Nasal 'Ozonic,'** and other dry inhalers, and are most beneficial for arresting and curing colds, and relieving influenza and chest affections.

For the inhalation of hot medicated moist air the **'Portable'** and **'Poor Man's Inhaler'** may be used *cf.* Creosote and other vapours.

Menthol—Camphor and other combinations, diluted with a heavy mineral oil, for spraying into the nares or in spirituous solution, inhaled as above, relieve swelling and irritability of nasal catarrh, contract capillary blood-vessels of mucous membrane, reduce swelling, relieve pain and fulness of head, arrest sneezing, check excessive discharge, and correct perverted secretion. *cf.* Nebulæ.

Aqua Mentholis. Menthol 1, Alcohol 15, Distilled Water 1,000.

Ⓟ**Menthophenol.** Menthol 3, Phenol 1. Useful as gargle; 15 drops to the tumbler of water.

Menthol Plasters, 10 to 15% in a suitable basis (Ⓟ if Lead basis) are useful for rheumatism and intercostal neuralgia.

Injectio Mentholis.

Menthol 0·5, Liquid Paraffin 100. For use with an Eustachian catheter to the middle ear.

Sterules, Hypodermic, of Menthol contain $\frac{1}{5}$ grain (0·012 Gm.) in 40 minims of Liquid Paraffin.

Insufflatio Mentholis. Menthol 1, Ammonium Chloride 3, Boric Acid 2, and Lycopodium 6, relieves nasal catarrh.

D P1 **Insufflatio Menthol et Cocainæ R.F.H.** Menthol 3 grains, Cocaine Hydrochloride $\frac{1}{2}$ grain, Boric Acid Powder $\frac{1}{2}$ ounce, Bismuth Carbonate $\frac{1}{2}$ ounce.

D P1 **Pulvis Mentholis et Cocainæ Compositus.** *Syn.* POUDRE CONTRE LE CORYZA. FR. CX. SUPP., 1920.

Menthol 1, Cocaine Hydrochloride 0·5, Bismuth Salicylate 45, Boric Acid 50·5.

Ⓟ**Linimentum Mentholis.**

Menthol 3, Chloroform 4, Olive Oil *q.s.* to 16; is useful in lumbago, neuralgia, sciatica, and ringworm.

P1 **Linimentum Mentholis Compositum.**—S. H.

Menthol 2, Aconite Liniment 1, Chloroform 4, Soap Liniment to 32.

In pruritus Menthol 1, Camphorated Alcohol, Chloroform and Ether of each 3 "dabbed on" lessens irritation.

Menthol-Paraffin Capsules contain a 1% solution of menthol in liquid paraffin. These have elongated ends, which can be torn off, and the contents dropped into the ear to relieve earache.

Mentholeate. Menthol and Oleic Acid *p. æquales.* Heat gently to dissolve. Useful in pruritus, etc., where absorption is desired.

Linctus Mentholis.—Vic. Park.

Menthol 1/16 grain, Glycerin 8 minims, Cherry Laurel Water 10 minims, Alcohol 90% 12 minims, water to 1 drachm.

Pastillus Mentholis, T.H., contains $\frac{1}{6}$ grain.

Pigmentum Mentholis.—1 to Olive Oil 4. Painted or injected into the larynx, or even the trachea, useful in phthisis, and laryngeal disease. Also applied on wool for ear affections.

Nebula Mentholis, 0·5 to 2% in liquid paraffin or Olive oil is used for spray or pigment for throat. Relieves acute laryngitis.—Tilley.

Vapor Mentholis Citriodoratus.

Menthol, Eucalyptus Oil (from variety E. *Citriodora*), Eau de Cologne, and Alcohol 90% of each, equal parts.

A little inhaled, *e.g.*, from an Ozonic Inhaler or the handkerchief, is valuable for nasal catarrh and influenza.

Unguentum Mentholis (3%) et Camphoræ (2%). Hay fever is well treated with, applied to the nasal passages in small quantity.

Pigmentum Mentholis cum Guaiacol. Menthol 1 grain, Guaiacol in crystals 1 grain, Oil of Almonds to 1 ounce.

In acute tonsillitis brushing with Menthol and Guaiacol (10% Menthol and 3 or 4% Guaiacol in Olive Oil) often has a good effect.—Dundas Grant, Pr. Mar. 1912.

Tabellæ Mentholis. *Dose.*—1 or 2, *ad libitum.*

Contain ⅕ grain menthol, combined with chocolate.

Pilula Mentholis. ½ to 2 grains, Mass with Powdered Soap or half its weight of White Wax previously *just* melted.

Ⓟ**Tinctura Menthol Ætherea,** for local application.

Menthol 1, Purified Ether 4, and Chloroform 4. In neuralgia.

Gossypium Mentholis. 10%. Saturate Cotton Wool 85 with Menthol 10 and Liquid Paraffin 5 in Ether 265 and spread out to dry. Useful to plug the nose in nasal catarrh.

Menthyl Valerianate. ✱VALIDOL. *Dose.*—10 to 15 minims (**0·6 to 1 Cc.**). TRADE MARK 216165. PATENT 3706/1896 now ***void.***

The specification contained in the patent method is so exceedingly vague as to lead one to assume that this is not a definite compound.

It is admitted to be a mixture of Menthol and Menthol Valerianate. Commercially we find the preparation apparently a solution containing about 25% menthol in Menthyl Valerianate. To make true Menthol Valerianate one would proceed by the customary methods of producing esters, *e.g.*:—

(1) Valerianyl Chloride to interact with Menthol with the application of heat; or (2) The passage of dry gaseous Hydrochloric Acid into a mixture of Menthol and Valerianic Acid in equivalent quantities to saturation point—the mixture being heated with reflux condenser during the process.

The product to be finally washed free of Hydrochloric Acid.

A colourless liquid with agreeable odour and free from burning taste of menthol. Nerve Sedative. Used in sea-sickness.

Synthetic Menthol (the subject of several patents), as distinct from the *B.P.*'14 Menthol is an optically *inactive* isomer. Its B.pt. is about 214—215° Its M.pt., when quite pure, 34° (Natural Menthol 43°). Commercially the synthetic type is supplied with M.pt. about 30° as it contains a small quantity of an *iso*-menthol. In other respects the two are very similar in cooling effect, taste, smell, etc. Physiologically it is 2½ to 3 times more 'toxic' than the ordinary, but Menthol can hardly be so termed. Prolonged inhalation is said to be more poisonous than that of ordinary Menthol.—P.R. 1923, 294; Y.B.P., '23,111.

The patented method consists in hydrogenating Thymol under pressure, using a Nickel catalyst. By agitating the liquid portion of the product with the next batch of hydrogenated Thymol an increased yield of crystalline substance is obtained.—P.R. '24,162. See also *ibid*, '24,277.

The synthseis of Thymol and Menthol from *p*-Cymene and 2-Cymidine. Patent specifications.—P.R. '24,316.

Inactive Menthol with M.pt. 35—36° said to be safe pharmacologically.—P.J. ii./27,176.

🄳 🄿1 MORPHINA. Fr. Cx.

$C_{17}H_{17}NO(OH)_2,H_2O = 303{\cdot}176.$

🄳 *Morphine and Diamorphine (commonly known as Heroin) and their respective salts, preparations and substances containing not less than one-fifth per cent. (one part in five hundred) of anhydrous morphine or one-tenth per cent. (one part in a thousand) of diamorphine. See also Opium and* 1925 *D.D.A.*

Dose.—⅒ to ⅓ grain (**0·006 to 0·02 Gm.**).

This, the principal alkaloid of opium, is in a white powder, or in white, shining crystals, ***Soluble*** in water about 1 in 5,000, slightly in ether and alcohol 90%; glycerin 1 in 150, oleic acid 1 in 10; solutions of its salts are precipitated by ammonia and by potash (but re-dissolve in the latter). It loses about 6% of its weight on drying at 90° C., 3 parts of Morphine are reckoned approximately equal to 4 parts of the Acetate, Hydrochloride, or Sulphate.

Solubility in chloroform by heating at 105° C. is increased.—Dott.

Morphine was discovered by Sertürner 1806 or possibly earlier by Derosne (1803).—B.M.J. i./21,59.

Constitution of the Morphine molecule and other members of the group. See Watt, Science Progress, Oct., 1909.

Incompatibility.—Morphine salts are decomposed by alkalis, and solutions are precipitated by vegetable compounds containing tannin, also with iron, lead, manganese, silver, copper, and zinc salts, Liquor Arsenicalis, and potassium permanganate.

The alkalinity of glass bottles (especially colorless) may throw out a very appreciable amount of morphine from a solution of a salt.

Antidotes.—Emetics should first be given and the stomach tube used. Wash out the stomach with Potassium Permanganate Solution; give strong hot coffee, or Ammonia, or Ether, Amyl Nitrite inhalation. Powdered Charcoal in Water *ad lib.* Physiological antidotes are Belladonna and Atropine. $\frac{1}{20}$ grain of the latter antagonises 1 grain Morphine (draw off the urine with catheter frequently). The following have also been given with good effect hypodermically:—Nitroglycerin, Picrotoxin, Pilocarpine, Strychnine. Oxygen inhalation, Saline solution intravenously and Brandy *per* rectum.

Potassium Permanganate as an oxidising antidote for many alkaloidal poisons. Should be used with stomach pump and emetics—more potent than physiological antidotes.

Morphine Suppository (1 grain) given in place of Glycerin—to infant 4 months, recovery under permanganate per rectum, and syphoned into the Stomach.—B.M.J. i./12,724

Atropine $\frac{2}{10}$ grain in doses of $\frac{1}{10}$ grain at intervals brought recovery where 4 grains of Morphine had been injected.—B.M.J. i./05,1040.

Opium Poisoning treated by Faradic Current.—L. i./12,1120.

Opium and morphine may poison infants through the mother's milk.

Poisoning by apparently 7 grains of Morphine and $\frac{1}{8}$ grain Atropine (combined). Treatment.—Stomach washed out with Permanganate. Injections of Strychnine and bleeding. Death.—B.M.J. i./13,1271.

Flavoring of liquid preparations of Morphine.—Glyl Rosæ, Syl Amygdalæ Amaræ; Syrupus Aurantii.

Uses of Morphine Salts.—A general and most useful sedative and anodyne for all purposes, but may cause indigestion and constipation. Hæmoptysis is well treated by $\frac{1}{6}$ to $\frac{1}{2}$ grain hypodermically. Employed in diabetes, but Codeine generally preferred. May be given in renal cases.—For restless painful nights with cardiac dyspnœa. Give a small dose at first.

Acute uræmia occurring with a chronic parenchymatous nephritis cured by Morphine and Atropine. The urine was almost solid with albumin. Venesection and Oxygen also employed.—A. H. Carter, B.M.J. ii./12,1181.

Mania may be treated by $\frac{1}{2}$ grain dose with chloroform in addition.

The two together produce deep sleep lasting several hours. Either alone is comparatively of little avail.

For children, contrary to usual opinion, experience showed that Morphine is well tolerated. It is preferable to the various Opium preparations. The initial dose is 1/10 milligramme per kilo of weight hypodermically. In children of 8 to 12 years 0·005 to 0·01 Gm. of Morphine Hydrochloride with Atropine was given.—P.J., ii./12.810.

Morphine Tablets under the tongue instead of ½ grain hypodermically found unsatisfactory on the "Tiger" in the Jutland Battle.—B.M J. ii./16,597.

Cardiac Asthma, acute attacks. Morphine ⅓ grain subcutaneously of great value.—Claude Wilson, L. ii./23,1346.

Whooping Cough cured by small doses of Morphine more speedily than by any other remedy.—B.M.J., i./25,1007.

Morphine acts only on certain ***pain centres in the brain*** and is therefore wasted in Lead and Opium Lotion and Laudanum fomentations. Rectal Morphine suppositories are efficacious only so far as Morphine is absorbed and carried to the brain. We are apt to fear the secondary effects of Morphine too much, rather than too little, and to forget that large doses of the synthetic products may cause sweating, rashes and sometimes cyanosis. —E. B. Leech, L. i./24,915.

Treatment of Drug Addiction.

In ***Morphine Habit*** Sparteine Sulphate has been used to replace the Morphine solution, commencing with ½, increased to ⅔ grain, four to six times a day. Sodium Bromide and Nitroglycerin Tablets are useful, *q.v.* Camphor has been given to relieve the craving; also Heroin and Dionin.

For the insomnia Gamgee suggested Veronal, for the circulatory and respiratory troubles full doses of Digitalis Tincture, repeated hypodermic Strychnine $\frac{1}{30}$ grain) injections. For the gastric catarrh Bismuth Carbonate (as much as 5 Gm.) first thing in the morning, with directions to change resting position as is done in treatment of gastric ulcer.

Turkish baths, heart tonics and Sodium Bicarbonate, *e.g.*, as Vichy Water with gradual weaning from the Morphine by the patient himself. With these exceptions, 'drugs,' especially hypnotics, should be little used. The habit can be "knocked out" in a relatively short time by Hyoscine and Atropine. Sparteine useful, also Bromide.—O. Jennings.

Morphinomania cured by Hyoscine. A severe case in which patient was taking 6 to 10 grains of Morphine Sulphate daily, and on one occasion 12 grains in 24 hours, cured by Hyoscine. During 8 days the patient had in all Hyoscine Hydrobromide 47/200 grain, Morphine 1¼ grains, Sodium Bromide 270 grains and Syrup of Chloral 20 drachms.—W. K. Anderson, Pr., June, 1912, per Pres., Oct., 1912, p. 255.

Berberine in dose of 0·1 to 0·2 Gm. in conjunction with Helenium has been used.

The sensations of Morphine (and cyanide) poisoning.—P.J. ii./22,218.

The morphinist is not a mental defective. Drug addiction does not lead to insanity or serious nervous diseases needing custodial care, but it makes the habitué more dangerous to society. It is not difficult to recognise drug addicts in society. Chief characteristics: plausibility and disorderliness. They lie for the sake of lying. They can work and write under the drug but disjointedly and in slovenly fashion.

15 *grains* of Morphine is an ordinary quantity for a morphinist to use in the 24 hours, though the same person will double this dose in case of any small imaginary trouble. The addict will probably never give information leading to disclosure of his source of supply. Results of withdrawal are described. Difficulties of treatment. The temperance is dependance on self control, not on control by others.—W. E. Dixon, B.M.J. ii./21,821. ***See also Prof. Dixon under Heroin, Opium, and Cocaine.***

Cases of ***Morphine Addiction over long periods,*** *e.g.*, a man of 71 who had taken ***30 grains daily for 40 years,*** cured by graduated doses and course of treatment in a few months, and others of an equally extraordinary nature. The conduct of these persons on emerging to relatively normal life gives grounds for grave anxiety. —Stanford Park, L. ii./26,121; P.J., ii./26,126.

In a typical case taking 12 grains of Morphine daily the dosage is cut down by 1 grain daily until 6 grains is reached, and this dose is continued until final reduction stage begins, when it is reduced by gradually decreasing amounts until final withdrawal 17 days later. Use a solution of 1 grain in 30 minims and give 4 injections in 24 hours, at 8 a.m., 12 noon, 5 p.m., and 10 p.m. The bulk and appearance of the injection must always be the same and patient must never have any idea of the size of dose. During the initial stages (up to 6 grains) both health and mental condition improve, but in the later stages and on total withdrawal there is great mental distress, insomnia, weakness, loss of appetite, and other symptoms. Blood pressure should be carefully watched: at withdrawal point the pulse becomes thready and this becomes more marked for 48 hours after withdrawal. If necessary, the injection of ½ grain Morphine will restore pulse in a few minutes. During the final stage the patient is given the following ***mixture***: Ammonium Bromide 2 drs., Potassium Bromide 1 dr., Tincture of Kola 1 oz., Concentrated Gentian Compound Infusion 1 oz., Liquid Extract of Licorice 4 drs., water to 6 oz.: one teaspoonful every 2 hours in a little water, continued until 4 days after withdrawal and then for 6 to 8 weeks without the Bromides. Also add 1/60 grain Strychnine Sulphate to the 8 a.m. injection, and inject 1 Cc. isotonic ***Colloidal Gold*** twice daily and ½ Cc. Calcium Glycerophosphate, 3 grains in 1 Cc., once daily. Hot baths of value for restlessness. Alcohol should never be given either during or after withdrawal. Patient should be quite well and fit for work in from 4 to 6 months after withdrawal.—D. E. Stanford Park, Pr., Nov. '27,297-307. ***See also Colloidal Gold.***

Gradual and cautious withdrawal covered by two successive waves of overdosage by "Special Mixture" (consisting of equal parts of Tincture of Belladonna and the fluid extracts of Hyoscyamus and Xanthoxylum *cf.* p. 226). and Luminal respectively. When the total dose is reduced to ⅛ grain in 24 hours, without discomfort, for two days saline is given in place of the drug. No distress at any stage and no crisis. Treatment lasts ten to fourteen days. —G. Laughton Scott, Pr., Jan. '27,56. See also B.M.J. ii./27,827, and Stanford Park, B.M.J. ii./27,1056.

EMETINE HYDROCHLORIDE, in the treatment of alcoholism and Morphine habit. Three doses each ⅙ grain (0·01 Gm.) per day for the first month or two; afterwards ⅙ grain twice daily for Morphine patients. For alcoholism ⅓ grain every other day.—M. Vivian, M.P.C., Nov. 29/22,448.

Ⓟ**Emetine Hydrochloride Sterules** contain ⅙, ¼ and ½ grain. 'I have found the ¼ grain Emetine Sterules most useful in my patient's case. Two days before I got them he was very sick and had dry retching and could take no food. I gave him one Sterule twice a day. The first settled his stomach and also enabled him to take less of the Morphine.'—A private communication.

Morphine Addicts—1926 Committee's Report on Addiction. See p. 1014.

What is wanted is international agreement on ***restriction of production.***—Rt. Hon. E. Shortt, Sec. of State for Home Dept., May 16/22.

See also Cocaine, Morphine, Heroin, Nicotine and Opium for further consideration of the subject.

𝔇 𝔓1 **Oleatum Morphinæ.** Morphine 1, Oleic Acid 60. Dissolve.

Oleic acid will dissolve as much as one-tenth of its weight of pure morphine. Morphine is added to oleate of mercury to relieve pain

𝔇 𝔓1 **Morphinæ Acetas,** Morphine Acetate (*B.P.* '14).

$C_{17}H_{19}NO_3, C_2H_4O_2,3H_2O = 399{\cdot}240.$

Dose.—⅛ to ½ grain (0·008 to 0·03 Gm.), which may be increased.

A white powder, *soluble* 1 in 2½ of water, also about 1 in 100 in Alcohol 90%, Glycerin 1 in 5.

𝔇 𝔓1 **Injectio Morphinæ et Atropinæ Hypodermica,** *Martindale.* Contains Atropine Sulphate 1 grain in 3 drachms of **Injection of Morphine Acetate** (1 grain in 6 minims). (**See also Sterules, p. 564.**)

Dose.—1 to 3 minims, 3 minims contain half a grain of morphine acetate and $\frac{1}{60}$ grain of atropine sulphate. The atropine increases the sedative action and counteracts the disagreeable effects of the morphine on the head, stomach, and bowels.

𝔇 𝔓1 **Ophthalmic Discs** are made containing $\frac{1}{500}$ grain **Morphine** and $\frac{1}{500}$ grain **Morphine** with $\frac{1}{5000}$ grain **Atropine** respectively.

𝔇 𝔓1 **Liquor Morphinæ Acetatis** (*B.P.* '14).

Dose.—10 to 60 minims (**0·6 to 4 Cc.**).

Morphine Acetate 1, Diluted Acetic Acid 2, Alcohol (90%) 25, Distilled Water to 100.

Ⓟ**Pastillus Morphinæ Acetatis** ($\frac{1}{30}$ gr.), *v.* Pastilli.

𝔇 𝔓1 **Pastillus Cocainæ** ($\frac{1}{15}$ **gr.**) **et Morphinæ** ($\frac{1}{30}$ **gr.**).

𝔇 𝔓1 **Morphinæ Hydrobromidum.**

$C_{17}H_{19}NO_3.HBr.2H_2O = 402{\cdot}116.$

Dose.—$\frac{1}{8}$ to $\frac{1}{2}$ grain (**0·008 to 0·03 Gm.**).

A white powder, soluble 1 in 22 of water and about 1 in 50 alcohol 90%. Given with hydrobromic acid as sedative, affects the head less.

𝔇 𝔓1 **Morphinæ Hydrochloridum** *B.P.* '14, U.S., Fr. Cx., P.G. VI.

$C_{17}H_{19}NO_3HCl.3H_2O = 375{\cdot}673.$

Dose.—$\frac{1}{8}$ to $\frac{1}{2}$ grain (**0·008 to 0·03 Gm.**), which may be increased.

In silky white crystals or in powder soluble 1 in 25 of water, about 1 in 67 of alcohol 90% (by expt.), and about 1 in 8 of Glycerin.

𝔇 𝔓1 **Guttæ Morphinæ et Cocainæ (Aural),** Morphine Hydrochloride 4 grains, Cocaine Hydrochloride 24 grains, Glycerin 1 drachm, Distilled Water to $\frac{1}{2}$ ounce. *N.B.—A potent preparation.*

Ⓟ**Linctus Morphinæ, U.C.H.**

Solution of Morphine Hydrochloride 3 minims, Chloroform Emulsion 3 minims, Treacle 60 grains, Water to 1 drachm. May be more agreeably flavoured with syrup of lemon.

Dose.—A teaspoonful 3 or 4 times a day; repeated frequently when cough is troublesome. Taken undiluted, swallowed very slowly. *For children* of 8 to 14 years, dose 10 to 20 drops. Not suitable for very young children, or in difficulty of expectoration in bronchitis.

Ⓟ**St. M.'s H.** has Morphine Hydrochloride Solution 10 minims. Honey $\frac{1}{2}$ drachm, Water to 1 drachm.

Ⓟ**Linctus Morphinæ, C.X.**

Solution of Morphine Hydrochloride 2 minims, Spirit of Chloroform 2 minims, Ipecacuanha Wine 2 minims, Mucilage of Acacia $\frac{1}{2}$ drachm, Water to 1 drachm.

Ⓟ**Linctus Morphinæ Hydrocyanicus** (Ogle's Drops), St. G. H.

Dilute Hydrocyanic Acid 1 minim, Solution of Morphine Acetate 3 minims, Oxymel of Squills to 1 drachm.

𝔇 𝔓1 **Guttæ Rosæ.**

Dose.—2 to 10 minims (**0·12 to 0·6 Cc.**).

Morphine 1, Citric Acid 0·5, Cochineal Tincture 8, Water to 50.

For cough,—a useful name and method of giving the drug.—Ph. Notes (Denmark, modified).

Ⓟ**Mistura Morphinæ et Phenazoni Composita,** *Martindale.*
Dose.—1 ounce (30 Cc.).

Solution of Morphine Hydrochloride 10 minims, Phenazone 10 grains, Tincture of Castor 20 minims, Spirit of Chloroform 10 minims, Syl Lavandulæ 1 drachm, Mucilage and Water to 1 ounce.

This is virtually a specific for spasmodic dysmenorrhœa.—W.W.W.

Ⓟ**Mistura Tussi Rubra.** *Dose.*—$\frac{1}{2}$ to 2 drachms (2 to 8 Cc.) in a little water. Dilute Hydrobromic Acid 5 minims, Morphine Hydrobromide $\frac{1}{32}$ grain, Diluted Hydrocyanic Acid $\frac{1}{8}$ minim, Spirit of Ether 5 minims, Tincture of Cudbear 5 minims, Syrup to 1 drachm. This forms a popular winter-cough mixture.

🄳 🄿1 **Liquor Morphinæ Hydrochloridi** (*B.P.* '14).
Dose.—10 to 60 minims (0·6 to 4 Cc.).

Morphine Hydrochloride 1, Diluted Hydrochloric Acid 2, Alcohol (90%) 25, Distilled Water to 100.

The Hydrochloric Acid is excessive and 20% of alcohol would be enough.—D. B. Dott, P.J. i./15,206.

If the Alcohol and Hydrochloric Acid be omitted and 5% of Glacial Acetic Acid substituted, the solution, kept in a dark cupboard, remains stable and free from fungus.—D. B. Dott, P.J. i./26,356.

🄳 🄿1 **Soluté de Morphine chlorhydrate pour injection hypodermique.** FR. CX. 2%. SOLUTIO MORPHINI HYDROCHLORIDI P. SVEC X. is 3%.

Ⓟ**Mistura Anodyna, N.H.W.** (Not in E.G.A.)

Solution of Morphine Hydrochloride 20 minims, Sal Volatile $\frac{1}{2}$ drachm, Water to $\frac{1}{2}$ ounce.

Ⓟ**Pulvis Morphinæ Effervescens.**

Dose.—1 or 2 of the following during the day. Morphine Hydrochloride $\frac{1}{6}$ grain, Potassium Bromide 10 grains, Antipyrin 10 grains, Citric Acid 40 grains, Tartaric Acid 40 grains, Sodium Bicarbonate 1 drachm, Lactose 1 drachm. For one effervescent powder. Very serviceable in dental neuralgia.

🄳 🄿1 **Suppositoria Morphinæ.**

Morphine Hydrochloride $\frac{1}{4}$ (*B.P.* '14) also $\frac{1}{2}$, 1, $1\frac{1}{2}$, and 2 grains (taking weight of the suppository as 15 grains).

🄳 🄿1 **Tablets, Hypodermic,** contain $\frac{1}{6}$, $\frac{1}{4}$, $\frac{1}{2}$ and 1 grain.

Trochisci Morphinæ et Emetin *v.* Emetin.

Ⓟ**Trochisci Morphinæ et Ipecacuanhæ** (*B.P.* '14).

Contain $\frac{1}{32}$ grain (0·002 Gm.) of Morphine Hydrochloride, with $\frac{1}{10}$ grain (0·006 Gm.) of Ipecacuanha in each. Useful to allay cough.

🄳 🄿1 **Morphinæ Hypophosphis.**
$C_{17}H_{19}NO_3.HPH_2O_2 = 351·211$. *Dose.*—$\frac{1}{8}$ to $\frac{1}{2}$ grain (0·003 to 0·03 Gm).

A white powder *soluble* 2 in 1 (by expt.) of water and about 1 in 14 of Alcohol. A very useful salt for injection.

🄳 🄿1 **Hypodermic Tablets** contain $\frac{1}{4}$, $\frac{1}{3}$, and $\frac{1}{2}$ grain.

B P1 **Morphinæ Meconas,**—MORPHINE MECONATE. *Syn.*—incorrectly MORPHINE BIMECONATE. (Solid Bimeconate is impossible.) $(C_{17}H_{19}NO_3)_2C_7H_4O_7+5H_2O$=860·432.

Dose.—$\frac{1}{8}$ to $\frac{1}{2}$ grain (0·008 to 0·03 Gm.).

This, one of the natural salts of morphine in opium, is in white minute acicular crystals, soluble in 1 in 34 of water. It is said to disturb the head and the stomach less than the other salts.

B P1 **Liquor Morphinæ Bimeconatis.**

Dose.—5 to 40 minims (0·3 to 2·4 Cc.).

Morphine (pure Alkaloid) 14½ grains, Meconic Acid 12 grains, Alcohol (90%) 1 ounce. Mix and add Distilled Water to 4 ounces. Filter. One ounce contains about 6·3 grains or 1·45% (*w/v*) of morphine bimeconate. It is about the same strength as tincture of opium.

B P1 **Pills** contain $\frac{1}{4}$ grain.

B P1 **Tablets, Hypodermic,** contain $\frac{1}{8}$ and $\frac{1}{4}$ grain.

B P1 **Morphinæ Periodidum.** $C_{17}H_{19}NO_3.2I$ = 539·024.

Dose.—$\frac{1}{16}$ to $\frac{1}{8}$ grain (0·004 to 0·008 Gm.).

A yellowish-brown powder containing 52·9% Morphine,

A considerable proportion of Morphine is dissociated in Physiological Acid (17·1% of the Periodide), and a considerable quantity (9·1% of the Periodide) is liberated on subsequent treatment with Physiological Alkali.

Solubility.—Soluble in Alcohol, very slightly soluble in Chloroform, insoluble in Ether and water.

Incompatible with alkalis, metallic salts and otherwise as alkaloids.

Uses.—The presence of Iodine, to the extent of 47·1%, in this body in a free or nascent condition may enhance the efficacy of the Morphine in it as an anodyne sedative remedy. As a remedy for sleeplessness it is equal to other Morphine compounds.

Dispensing Note. To be given alone, in cachet or 'slipule' after food.

B P1 **Morphinæ Sulphas,** $(C_{17}H_{19}NO_3)_2H_2SO_4 + 5H_2O$ = 758·480.

Dose.—$\frac{1}{8}$ to $\frac{1}{2}$ grain (0·008 to 0·03 Gm.).

In white silky acicular crystals. Soluble 1 in 23 of water, very slightly in alcohol 90%.

B P1 **Sterules, Hypodermic, of Morphine Sulphate** contain $\frac{1}{8}$, $\frac{1}{6}$, $\frac{1}{4}$ and $\frac{1}{2}$ grain (0·008, 0·01, 0·016 and 0·03 Gm.).

B P1 **Hypodermic Tablets** contain $\frac{1}{8}$, $\frac{1}{6}$, $\frac{1}{4}$, $\frac{1}{3}$, $\frac{1}{2}$ and 1 grain; also combined with **Atropine** as follows:—

Morphine Sulphate	$\frac{1}{8}$,	$\frac{1}{6}$,	$\frac{1}{4}$,	$\frac{1}{3}$,	$\frac{1}{2}$ gr.
Atropine Sulphate	$\frac{1}{200}$,	$\frac{1}{180}$	$\frac{1}{150}$,	$\frac{1}{120}$,	$\frac{1}{100}$ gr.

B P1 **Hypodermic Sterules** contain **Morphine Sulphate** $\frac{1}{8}$ grain with **Atropine** $\frac{1}{120}$ grain, and $\frac{1}{4}$ grain with Atropine $\frac{1}{100}$ grain.

Morphine and Atropine are given before anæsthesia, effected by gas and ether, to lessen the amount required and to minimise the secretion from the mouth and lungs.

B P1 **Hypodermic Tablets of Morphine Hydrochloride** $\frac{1}{8}$, **Atropine Sulphate** $\frac{1}{200}$, **and Nitroglycerin** $\frac{1}{200}$ **grain.** Used in asthma.

𝔅 P1 **Morphinæ Tartras, Morphine Tartrate.**

$(C_{17}H_{19}NO_3)_2.\ (CH.OH.COOH)_2,\ 3H_2O = 774{\cdot}416.$

Dose.—⅛ to ½ grain (0·008 to 0·03 Gm.).

In small white nodular tufts of acicular crystals, readily soluble 1 in 10 of water, slightly in alcohol 90%.

𝔅 P1 **Injectio Morphinæ Hypodermica** (*B.P.* '14).

Dose.—5 to 10 minims (0·3 to 0·6 Cc.).

Contains 2·5% of Morphine Tartrate (1 grain in 44 minims).

𝔅 P1 **Liquor Morphinæ Tartratis** (*B.P.* 14).

Dose.—10 to 60 minims (0·6 to 4 Cc.).

Morphine Tartrate 1, Alcohol (90%) 25, Distilled Water to 100.

P1 **Ethyl-Morphine Hydrochloride,** P. Hung., Svec., P. Jap. IV.; Fr. Cx. Supp. II. U.S. X., P.G. VI., Ph. Ned. V.

Syn. ✻**Dionin.** (T.M. 217175)

$C_2H_5C_{17}H_{18}NO_3.HCl.H_2O = 367{\cdot}673.$

Manufacture.—According to Von Mering's Patent (No. 13,703 of 1899), Morphine is dissolved in alkali. Caustic Soda or Sodium is added in calculated quantities and then Ethyl Bromide, *q.s.* The mixture is heated for 1 to 2 hours at 80 to 100° C. Merck's Patent 14,366 of 1901 deals with the same subject.

It may be prepared by heating Morphine with Sodium Ethylate 1 molecule and Ethyl Iodide 1 molecule.—Beilstein III., 908 (674).

We would suggest dissolving Morphine 1 molecule in Ethyl Alcohol and heating with a molecular proportion of Sodium Hydrate and a molecule of Ethyl Iodide in Ethyl Alcohol as solvent at about 60° C. in a closed vessel until interaction is complete, finally extracting with Ether and then converting the base into the Hydrochloride.

As an alternative Ethyl Sulphate in the presence of Alcohol and Sodium suggest themselves—on the lines of Merck's patent for making Codeine (D.R.P. 102,634).

British made Ethyl-Morphine has been available for some years past.

Dott finds $2H_2O$ in the compound. Morphine contains one alcoholic and one phenolic OH. In this body the H of the phenolic OH is replaced by C_2H_5.

Dose.—¼ to ½ grain (0·016 to 0·03 Gm.). Maximum dose in 24 *hours*, 1½ grains; Fr. Cx. Supp. II. says 3 grains (0·2 Gm.), P.G. VI. 5 grains (0.3 Gm.).

A white crystalline powder ***soluble*** 1 in 10 to 11 of water (*cf.*P.J. i./12,425) and 1 in 25 of alcohol 90% (by experiment). Insoluble in ether. M.pt. is ill-defined; 124° C. usually given is too high for the fully hydrated salt and too low for the salt dried at 115° C.—Dott.

Uses.—To replace codeine and morphine in bronchitis, pulmonary emphysema, and bronchial asthma, and for whooping-cough.

A useful anodyne in glaucoma, iritis, corneal ulcers, etc. Solutions may be from 1 to 5% strength or more.

CORNEAL OPACITIES, for promoting absorption of an instillation of 5% infusion of crushed Jequirity Seeds, of value.—Lieut.-Col. H. Kirkpatrick, L. i./21,1304; see also Trachoma, Therap. Index. Dionine if used strong enough—5%—and provided a good reaction is set up—seems useful.—T. L. de Courcy, B.M.J. ii./21,737.

May cause "ophthalmic fireworks," pain, chemosis, swelling, and sneezing.

In interstitial keratitis with potassium iodide internally, and yellow precipitate ointment in the conjunctival sac of service.

Ⓟ**Guttæ Dionin** R.O.H. 1, 2, 5 or 10%. Mid. H. 1927 has 1 to 5% approx.

Ⓟ**Sterules** (Ophthalmic) **of Dionin** contain 5% Solution.

(P) **Sterules, Hypodermic of Dionin** contain $\frac{1}{6}$ grain (**0·01 Gm.**).

P1 **Ethyl-Morphine** (Base), has no distinct M.pt. It is soluble about 1 in 500 Water and 1 in $1\frac{1}{2}$ Alcohol at 25° C.

B P1 **Diamorphinæ Hydrochloridum.** *Syn.* **Diaphorm** (*Martindale*), **Diacetyl-Morphine Hydrochloride, P. Jap.** IV., Fr. Cx. Nouveau Supp., P.G. VI.

✱**Heroin** (T.M. 322540) **Hydrochloride** $C_{17}H_{17}(OCH_3.CO)_2NO.HCl. = 405·657$. (*B.P.* '14 + H_2O). The Hydrogen atoms of both the alcoholic and the phenolic OH groups are replaced by the $CH_3.CO$ groupings. M.pt. about 230° C. Aqueous solution must not colour blue with Ferric Chloride (absence of Morphine).

This body was first produced in London by Beckett and Wright.

Dose.—$\frac{1}{25}$ to $\frac{1}{8}$ grain (**0·0025 to 0·008 Gm.**). Maximum dose in 24 hours (P.G.) 0·015 Gm. Fr. Supp. II. 0·02 Gm.

In white crystalline powder, ***soluble*** about 1 in $2\frac{1}{2}$ of water and about 1 in 13 of alcohol 90% (our experiments). ***Incompatibles***—Both alkalis and acids and other chemicals as morphine.

Uses.—Sedative for cough, *e.g.*, in phthisis, bronchitis, and laryngitis, also in asthma. Has been given in hæmoptysis. Lengthy use must be guarded against. Useful in acute coryza.

Often more effectual than Morphine in relief of severe nerve pain. It does not constipate. The danger of addiction from its continual use must never be forgotten.—Sir W. Willcox, P.J. i./26,508.

In hay fever the following has been recommended: Heroin $\frac{1}{12}$ grain, Atropine Sulphate $\frac{1}{200}$ grain, Caffeine Citrate 1 grain, Salophen 5 grains. In cachet, one every four hours.

Recovery after 9 grains is on record.

J. C. McWalter said it is less toxic than morphine, but not 4 times as strong in action—*cf.* B.P. doses—$\frac{1}{8}$ grain as against Morphine $\frac{1}{4}$ grain.

Flavoring.—*Vide* Morphine.

B P1 **Tablets, Hypodermic,** $\frac{1}{24}$ and $\frac{1}{12}$ grain.

B P1 **Tabellæ** $\frac{1}{10}$ grain, in chocolate basis for administration *per os.*

B P1 **Morphinum Diacetylicum, P. Austr.** *Syn.* Aceto-morphine. The base of the above salt. Soluble in water 1 in 800.

(P) **Glycaphorm.** *Syn.* Glycerole of Diacetyl-Morphine Hydrochloride, Linctus Heroin, Syrupus Heroin.

Contains $\frac{1}{48}$ grain Diacetyl-Morphine Hydrochloride in 1 drachm of a vehicle consisting of Glycerin 3, Syrup of Roses 4, Water 1.

Dose.—1 to 2 drachms (**4 to 8 Cc.**).

This preparation forms a useful linctus for coughs, and is employed in bronchitis, pertussis, laryngitis, asthma, and similar disorders.

(P) **Glyco-Heroin.** *Syn.* **Glykeron.**

(*This preparation is just outside the requirements of* P1 *and therefore outside* B *in Diamorphine base content reckoned on Hydrochloride +* H_2O.)

Dose.—1 drachm (4 Cc.) (= $\frac{1}{16}$ grain of Diacetyl Morphine Hydrochloride) repeated; children of 10 or more years 15 to 30 minims (1 to 2 Cc.) or less. A proprietary article. Is given for coughs, asthma, pneumonia, bronchitis, etc.

Heroin and Morphine Addiction.—Heroin is used sometimes by injection and sometimes as a snuff like Cocaine. Supplies here and in U.S. were readily obtainable. It was vaunted as a cure for morphinism. The addict prefers it to Morphine. The Morphine addict has only one or two stools a week, whereas the bowels of the Heroin addict are almost normal. There is not so much pallor or emaciation. In New York Heroin is used almost entirely.—W. E. Dixon, B.M.J. ii./21,821.

British trade in Morphine and Heroin—figures from 1910-1923. The figures for Morphine and salts manufactured fell from 1,033,162 oz. in 1916 to 87,940 oz. in 1923.—B.M.J., ii./24,830. See also B.M.J. i./20,339.

Departmental Committee on Morphine and Heroin Addiction (1924) reported (1) on circumstances in which supplies may be regarded as ***medicinally advisable,*** and (2) whether desirable that preparations containing less than B amounts should be brought into the provisions of the acts and regulations. Addictions rare in this country.

There is little, if any, abuse or danger from any preparation at present excluded, with possible exception of Chlorodyne—there is some risk. Suggestion made that no preparation should be sold under the name 'Chlorodyne' which contains more than 0·1% Morphine.—P.J., i./26,238; B.M.J. i./26,391.

Complete Prohibition of Heroin probably desirable.—W. E. Dixon, B.M.J., ii./27,236.

See also p. 1014, *and Absts. under Cocaine, Morphine, Opium, Nicotine.*

P1 **Morphine-Methyl Bromide.** *Syn.* MORPHOSAN.

$C_{18}H_{22}NO_3Br.H_2O = 398·118.$

Dose hypodermically, ⅛ to ¼ grain (**0·008 to 0·016 Gm.**)

White needles soluble 1 in 20. Comparatively with Morphine it is non-poisonous—it is thought to be 10 times less potent.

Uses.—In epilepsy, also for use with Scopolamine *q.v.* as anæsthetic.

P1 **Morphine Methyl Chloride.** $B.CH_3Cl.2H_2O = 389·689$. It loses one molecule of water at 100° C. and the other at 135—140° C. Soluble 1 in 10 water. It resembles Morphine in its reactions with Ferric Chloride, Nitric Acid, etc., but its solution gives no precipitate with Sodium Carbonate or Ammonia, while its acidified solution gives a bulky crystalline precipitate with Potassium Ferrocyanide, Morphine salts yielding no precipitate.—D. B. Dott, P.J. i./21,232.

P1 **Benzyl-Morphine Tartrate.**—Soluble readily 1 in 3. The Hydrochloride of this base is readily soluble 1 in 200; the Sulphate 1 in 170.—D. B. Dott P.J. i./26,356.

P1 **Papaverina.** $C_{20}H_{21}O_4N = 339·176$. An alkaloid of Opium (0·5 to 1%). M.pt. 147° C. Easily soluble in hot alcohol, but with difficulty in the cold.

P1 **Papaverinæ Hydrochloridum. Ph. Ned. V., P. Svec. X.** $C_{20}H_{21}O_4N.HCl = 375·641$.

Dose.—½ grain (**0.03 Gm.**) to 3 grains (**0.2 Gm.**)

P.G. VI. gives latter as max. single dose and 10 grains (**0.6 Gm.**) as max. dose in a day.

A white crystalline powder slowly soluble 1 in 40 in water. The Sulphate is more employed, *v. infra.*

P1 **Papaverinæ Periodidum.** $C_{20}H_{21}O_4N.2I = 593·04$.

Dose.—½ grain (**0 03 Gm.**) carefully increased if necessary.

When made by interaction of Papaverine and Iodine in suitable solvent (*cf.* Alkaloidal Periodides) the compound is obtained as a dark-red crystalline powder containing 57·1% Papaverine, according to investigations in the author's laboratories (1923).

Solubility.—Slightly soluble in Alcohol, almost insoluble in Chloroform and Ether, insoluble in water.

Uses.—Salts of Papaverine have attracted attention by their analgesic action. The Periodide, containing 57·1% of the alkaloid, in conjunction with 42·9% of Iodine in a labile form, suggests it being of value in gastric and intestinal spasms. It is also worthy of trial in bronchial spasmodic affections.

Dispensing Note.—To be given alone, in cachet or 'slipule,' preferably after food.

$\boxed{\text{P1}}$ **Papaverinæ Sulphas.** $(C_{20}H_{21}O_4N)_2H_2SO_4 = 776{\cdot}432$.

Dose.—½ to 1¾ grains (0·03 to 0·11 Gm.) *per os* or hypodermically up to 8 grains (0·5 Gm.) in a day.

A white crystalline powder soluble 1 in 2 in water—by expt.—W. H. M. It is said to be non-toxic in single doses of even 1 Gm.

A rather feeble central analgesic and a local anæsthetic. Does not induce a habit like morphine. In all kinds of gastric and intestinal spasms (also for the diagnosis of pyloric spasm); in biliary colic; and in bronchial spasm. Of more doubtful value in pertussis, hyperemesis, and vascular spasm—angina pectoris, acute uræmia, and eclampsia The local anæsthetic action, with vasodilatation, has been used against rhino-asthma, and to mitigate the pain of irritant injections.—Pal, Jl. American Medical Association.

Papaverine has a Strychnine-like action which is missing in its methochloride and reappears in its reduction product Laudanosine.—F. L. Pyman, L. ii./17 924.

Ureteral Calculus treated by Papaverine. In the case of a man aged 72, after catheterisation and injection of oil had failed 5 Cc. of 2% solution Papaverine Hydrochloride were instilled through a catheter and six days later 5 Cc. of 2% Papaverine Sulphate Solution. Stone was removed from floor of bladder with Young's rongeur. In another case of a man aged 40, ten days after instilling 5 Cc. of the Papaverine Hydrochloride Solution fragment of stone was dislodged and recovered in bladder washings. Papaverine Sulphate Solution was again instilled and the following day the stone was produced in the urine. In a further case of a man 33, withdrawing catheter to a point just above obstruction, 3 Cc. of the Hydrochloride Solution were instilled and the stone was expelled a few days later per urethra. Striking feature in these cases was the absence of renal colic following the use of Papaverine. It is non-toxic in the dosage employed. Both sulphate and hydrochloride were prepared from the alkaloid Papaverine and two per cent. solutions of each made up. No difference was noted in the action of these two solutions; *the sulphate is much more soluble and therefore recommended for use.* The action is unquestionably due to the analgesic properties of the alkaloid and its effect in overcoming spasms of the ureter.—H. A. Fowler, Annals of Surgery (U S.A.) May, 1917.

Tablets of Papaverine (Base) ⅓ grain, **Hyoscyamine** (Base) $\frac{1}{500}$ grain, and **Benzyl Succinate** 5 grains.

Employed for calmative analgesic effect.

Combination of Narcotic Drugs.

It has been shown that combinations of Narcotic Drugs may be more potent than would be expected by taking the sum of the two substances, *e.g.*, in the case of Codeine Diethylbarbiturate+Sodium Diethylbarbiturate. In other instances by adding a weak substance to a potent narcotic, marked increase in narcotic power occurs. (The maximum effect, according to Straub, in the case of Morphine + Narcotine only occurs with certain proportions.)

The same exists in the case of the naturally occurring Opium Alkaloids. A mixture of all the alkaloids of Opium has a narcotic effect not only greater than the Morphine in it will account for, but much greater than a summation of the effects of the different alkaloids would lead one to expect.—B.M.J.E. i./13,84.

Morphine Meconate is stated to be 25% stronger than the equivalent dose of Morphine Hydrochloride—due to the action of the Meconic radical.

BURGI'S THEORY is as follows :—

Drugs having the same physiological action summarise their therapeutic effect when given together, but drugs of different pharmocological action given together increase their activity markedly more than the sum of their action when given separately—they probably act on different cells. Thus Morphine, Codeine, Heroin, and Thebaine give results equal to the sum of their effects, but combined doses of Morphine, Narcotine, and Papaverine are 20 to 50% more toxic than the same doses separately. The word **Synergism** has been adopted to indicate the action of one drug in enhancing the effect of another.

P1 **Codeonal.** *Dose.*—Two 2½ grain Tablets in the evening.

A combination of Codeine Diethylbarbiturate (2 parts) with Sodium Diethylbarbiturate (15 parts).

It appears that Codeine is the only Opium alkaloid that can form this combination. *Soluble* about 1 in 30 of water.

Uses.—Hypnotic, in disease of the nervous system and pulmonary disorders. It takes effect after about half an hour.

E P1 **Morphine Narcotine Meconate.** *Syn.* ★**Narcophin** P.G. VI. (T.M.341895.) PATENTS : (Nos. 13293, of 1912, and 3402 of 1913.) The former became void in the 8th year and the latter void in the 4th.

Dose.—⅓ to ½ grain (**0·02 to 0·03 Gm.**).

The compound made by dissolving Narcotine, Morphine and Meconic Acid in equimolecular proportions in Alcohol and precipitating with Ether contains slightly more Morphine and Meconic Acid and slightly less Narcotine and Water than required by the formula $C_{17}H_{19}NO_3.C_{22}H_{23}NO_7.C_7H_4O_7.4H_2O$. The slight excess of Acid makes the body easily *soluble* in water. A mixture of the constituents in powder form in molecular proportions is not perfectly soluble. The discrepancies are therapeutically not serious.—D. B. Dott, P.J. i./13,99. On heating a compound of the above formula there is evident evolution of gas at 140° but it does not distinctly melt until 168° is reached.—D. B. Dott, P.J. i./21,232; C.D. Mar. 26, 1921, p. 429.

Narcophine is *soluble* 1 in 5 in water approximately, but not completely, and the solution is not improved by adding more water—on the contrary.—D. B. Dott, *ibid.*

Uses.—Hypnotic. It is similar in action to Morphine and Scopolamine and is used where Morphine is employed, also where Morphine alone is inadmissible (diseases of organs of respiration, etc.).

It is stated that the paralysing action of Morphine on the respiratory centre is lessened greatly by adding an equal quantity of Narcotine. In the case of mice the toxicity of the two together is so small as to be hardly measurable. The most increase in narcotic effect is obtained by using equal weights.

E P1 ★ **Spasmalgin** (T.M. 397986).—Combination of Papaverine, Omnopon and Atrinal (a Sulphonic derivative of Atropine). In gastric pain, colic and painful menstruation.—L. ii./20,506.

1.1 Cc. of Spasmalgin Injection or each Tablet corresponds to 0·02 Gm. Papaverine, 0·001 Gm. Atrinal and 0·01 Gm. Omnopon. *Dose.*—One to two tablets a day increased to four in severe cases.

See also ***Synergistic Method of Painless Childbirth*** (Gwathmey) ***by Rectal Ether Analgesia.***

MULLS.

Anserine Mulls consist of Medicated Ointments prepared with a basis of **Goose Grease (Oleum Anseris)** depurated and benzoated, spread on calico Bandages. They are prepared 4 and 7½ inches wide by 1 yard. Goose fat possesses the *highest penetrating power* amongst absorbent ointment bases. The following **Medicated Anserine Mulls** are made :—

Acid Boric 10%
Acid Carbolic 2%
Betanaphthol 5%
Chrysarobin 2%
Ferric Oleate 5%
Ichthyol 10%
Iodine 2%
Oleum Rusci 5%
Potassium Iodide 10%
Scarlet Red 4%
Sulphur 10%
Thiosinamin 5%

Adepsine Mulls are bandages similar to the above, but prepared with Benzoated Lard basis. This is suitable where deep penetration is not so essential, *e.g.*, **Adepsine Mulls** :—

Acid Boric 10 and 20%
Acid Carbolic 2 and 4%
Acid Salicylic 5 and 10%
Bismuth Carbonate 20%
Calamine 10%
Cupric Oleate 10%
Liquor Carbonis Det. 10%
Menthol 5%
Resorcin 5%
Thorium Oleate 25%
Zinc Oxide 10%
{**Zinc Oxide** 20%
{**Ichthyol** 10%
{**Zinc Oxide** 20%
{**Calamine** 5%

Plaster-Mulls of soft rubber adhesive plaster basis, spread on cotton cloth.

No			
2		Acid Boric ..	40*
4		,, Carbolic ..	15
9		Acid salicyl. ..	50
64	Ⓟ	Acid. salicyl. .. Ext. cannab. ind.	40 10
76		Ac. salicyl. Creosote ..	20 40
6		Chrysarobin ..	15
15		Hydrarg. . ..	55
16		Hydrarg. . .. Acid. carbol ..	55 15
17		Hydrarg .. .. Zinc Oxide ..	30 7½
No.			
88	Ⓟ	Hydrarg.. .. Acid. carbol. .. Hydrarg. perchlor Zinci oxidum ..	30* 15 4 15
204		Ichthyol . ..	40
7		Pyrogallol ..	40
231		Thiosinamin ..	40
24		Zinc ox.	45
74		Zinc ox. .. .. Ichthyol . ..	35 17

NAPHTHOL.

Beta-Naphthol (*B.P.* '14). U.S., Fr. Cx., P. Belg., P. Austr., Ph. Ned. V., $C_{10}H_7OH$ = 144·064.

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**) in cachet or Slipule (No. 00 for 5 grains). Fr. Cx. *Max. single dose* 15 grains ; Max. dose during 24 hours 45 grains approximately.

Manufacture.—
Naphthalene is sulphonated at about 180° C. and the resulting β-Naphthalene Sulphonic Acid is fused at 300° C. with Caustic Soda. Further Notes XVIIIth Edn., p. 563.

β Naphthol has a faint Storax odour ; when sublimed it is in white shining laminar crystals ; ***soluble*** in alcohol 1 in 2, ether 3 in 4, chloroform 1 in 24, and 1 in 24 benzol; 1 in 12 of olive oil and lard, and 1 in 80 of vaseline. Addition of boric acid increases solubility in water.

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* Percentages. Note Acid Salicylic is also made 30, 25, 20, 15, 10 and 5%
Plasters, Rubber, white adhesive, containing a proportion of Zinc Oxide pread on pink cotton. They are 2½, 3¾ and 5 Cm. wide, in spools.

Incompatible with Camphor, Ferric Chloride, Menthol, Phenazone and Phenol.

Uses.—Internally, in enteric fever; safe and efficient, but sometimes causes too much gastric disturbance. In dilated stomach, dyspepsia and other disorders. In cholera, as preventive, and in treatment of early stages; and used as a vermifuge. In kidney disease it is contraindicated.

It is a powerful antiseptic and germicide. In advanced scabies, an ointment of 10 to 15% cures the eczema as well as destroys the parasite, but the **Compound Ointment L.H.** (Kaposi's Ointment) is preferred.—β-Naphthol 15, Lard 100, Green Soap 50, Prepared Chalk 10. Useful also in psoriasis.

β-Naphthol 5, Alcohol 100, Glycerin 10, is a remedy for hyperidrosis of palms, soles, and axillæ.

Pills and Tablets, β-Naphthol 3 and 5 grains, are prepared.

Tablets of Betanaphthol 5 grains (**0·3 Gm.**) **with Phenolphthalein** 3 grains (**0·2 Gm.**).

To combat ankylostoma infection. A **useful** combination.

TRACHOMA treated by '**Oxidised Naphthol Camphor.**' The remedy should be freshly prepared, 2 parts of Camphor and 1 of Naphthol warmed gently and filtered, and the mixture allowed to oxidise in a clear glass vessel to syrup consistence and brown mahogany colour. The application is made with a small brush well soaked in the solution and then wiped nearly dry. Four to ten applications suffice.—G. Gerard, Pres. Sept. '20,312.

Betanaphthol 5 grains, Salol 5 grains and Calomel 1/6 grain combined in capsules valuable in flatulent DYSPEPSIA. A paper on pre-operative treatment of enlarged prostate.—J. W. Thomson Walker, B.M.J. i./21,71.

ANKYLOSTOMIASIS AND MALARIA. 75% of malaria cases in Malay States are also ankylostomiasis cases. It may be that the ankylostoma worm is as much responsible for malaria as the mosquito. Quinine cannot be given in large or continuous doses. Best results with Betanaphthol and Ol. Chenopodii.—D. Bridges, B.M.J. ii./21,149.

Ankylostomiasis treated by 30 grain doses caused poisoning. Thymol may be safer.—W. B. Orme.—B.M.J. ii./15,176.

TÆNIA.—Beta-naphthol, 15 grains for ten days, on an empty stomach effectual, after male fern had eliminated everything except the head.—J. W. Tomb, L. i./23,1131.

ASCARIS infection treated with Betanaphthol showed microscopic cure of 69·8% after first treatment and 31·2% after second—though none of the stools examined showed ascaris.—C. N. Leach and G. E. Hampton, per Jl. Trop Med., May 1/23,145.

Charbon Naphtolé *Dose.*—60 to 120 grains. A granular preparation of wood charcoal, containing 5% β-naphthol, for use in ailments of the stomach and intestines.—Ph. Notes, Greece.

Ph. Ital. IV. gives:—Beta Naphthol 3, Charcoal 4, Magnesium Oxide 3, prepared with Alcohol 95%, 5.

α-Naphthol $C_{10}H_7.OH$ = 144·064 is said to have greater antiseptic power, but given internally causes more irritation.

Manufacture.—This is also made from Naphthalene on similar lines. The sulphonation must be conducted at a *very low* temperature.

A solution of 1 in 3,500 of water is used to wash out the intestines by rectal injection.

Dose.—2 to 5 grains (**0·12 to 0·3 Gm.**) but larger doses are given.

Benzonaphthol.—*Syn.* **Benzoyl-Naphthol.** Beta-Naphthol Benzoate. Fr. Cx. $C_{10}H_7OOC:C_6H_5 = 248·096$.

Dose.—4 to 10 grains (**0·25 to 0·6 Gm.**) in cachet or suspended.

Manufacture.—Add Benzoyl Chloride 140 to finely powdered β-naphthol 144. Then heat to 125° C. ½ hour and pour the liquid into equal volume of water. Filter off and recrystallise (*twice*) from Alcohol, and wash with water.—M.Pt. 110° C.

A white crystalline powder. Soluble in alcohol and chloroform, almost insoluble in water. An intestinal antiseptic and diuretic, *e.g.*, in typhoid. May be combined with bismuth salicylate. Externally is used 3 to 10% in ointments. **Tablets**, 5 grains, to be crushed and taken in a little water.

Betol. *Syn.* **Naphthalol, Betanaphthol Salicylate.** Fr. Cx. $C_6H_4OH.CO.OC_{10}H_7 = 264·096$.

Dose.—3 to 8 grains (**0·2 to 0·5 Gm.**) in cachets or pills, or suspended in almond emulsion or milk.

Manufacture.—It is generally directed to heat Sodium Salicylate and β-Naphthol-Sodium with Phosphorus Oxychloride as in making Salol. The compound is washed and recrystallised from Alcohol.

We did not find this method satisfactory. It is better to use Beta Naphthol and Sodium Salicylate; the yield however is only about 60% of theory.—

Beta Naphthol 144 and Sodium Salicylate 168, are intimately mixed and the Phosphorus Oxychloride 80, added with trituration. When solid the mixture is transferred to a flask and heated until Hydrochloric Acid ceases to be evolved. Recrystallise from spirit. Melting point 95° C. The equation is:—

$$2C_{10}H_7OH + 2C_6H_4OH.COONa + POCl_3 = 2C_6H_4OH.COOC_{10}H_7 + NaPO_3 + NaCl + 2HCl$$

The substance is not soluble to any extent in Sodium Hydrate solution which is remarkable as it contains a Phenolic Hydroxyl group.

In small tasteless white crystals, insoluble in water, soluble in alcohol. Useful in rheumatism, cystitis, and intestinal catarrh.

Cachets of Betol and Bismuth Salicylate, 5 grains each, useful as an intestinal disinfectant. Contra-indicated in renal disease.

Naphthalene. Ph. Ned. V. $C_{10}H_8 = 128·064$.

Dose.—2 to 15 grains (**0·12 to 1 Gm.**) in cachets.

A hydrocarbon formed in the manufacture of coal gas. In white crystalline plates (M.pt. 80° C.) with persistent odour.

Soluble in Ether 1 in 3, in Alcohol 1 in 25, in Olive Oil 1 in 8, in Chloroform 1 in 1½, insoluble in water.

Uses.—As an intestinal disinfectant for the diarrhœa of consumption, and of typhoid and for dysentery. 8-grain enemata are useful. Is painless in action, and promotes healing of ulcers. Internally, *e.g.* in Malt Extract, with success to lessen fœtor of urine and stools. A vermifuge in tænia and ascarides. Suppository and ointment (10%) are used for pruritus ani. A 10 to 20% solution in oil is successful as a parasiticide in scabies. The vapour is inhaled for whooping cough.

Seven doses (1·75 Gm in all) of Naphthalene taken as anthelmintic in the case of a child six years old caused death.—P.J. ii./11.407.

Pilula Naphthalini, 3 grains.

A **Precipitated Form** is also made by adding an alcoholic solution to water. For use as a dusting powder diluted 1 in 10.

Mosquitos in wells, etc., can be destroyed by Naphthalene.—B.M.J. ii./14,15

N.C.I.—Naphthalene of commerce with 2% Creosote and 2% Iodoform.

Used as a vermicide to dust the clothes in the war. Must not be used too freely especially at the fork, as it may smart. Used in conjunction with Vermijelli. A cheap inert powder might replace the Iodoform, thus Naphthalene 96, Creosote 2, French Chalk 2.—J. P. Kinloch, B.M.J. i./16,790.

Undervests of butter muslin dipped in a solution of 1% each Naphthalene and Sulphur in benzol or petrol effectual in preventing pediculosis.—J. A. Gunn, B.M.J. i./17,579.

Naphthalene Tetrachloride.—*Syn.* NAPHTHALIN HYDROCHLORIDE, $C_{10}H_8Cl_4$ = 269·892. *Dose.*—3 to 12 grains (**0·2 to 0·8 Gm.**).

Manufacture.—Mix well powdered Naphthalene 400 and Potassium Chlorate 800 and dust into concentrated commercial Hydrochloric Acid in an *open* vessel (chlorine is given off) with care. Allow to stand for several hours. Drain off the liquor from the yellow mass and wash with water. Warm with alcohol to about 80° C. and filter, rejecting the liquor. The residue is again extracted with alcohol until it is white; everything dissolves except the Naphthalene Tetrachloride. Recrystallise from Chloroform.

White crystals, melting at 182° C., insoluble in water.

Has been used in cases of bacterial intoxication such as colitis with improvement. It is doubtful whether the substance acts as an antiseptic after leaving the stomach. It was tried in 8 grain cachets every 4 hours (night as well).—J. Langford Moore, St. Bart.'s Hosp.

Formagules of Naphthalene Tetrachloride contain 5 grains.

$\boxed{\text{P1}}$ NARCOTINA.

Syn. ANARCOTINE. $C_{19}H_{14}(O.CH_3)_3NO_4$ = 413·192.

Dose.—1 to 3 grains (**0·06 to 0·2 Gm.**) or more in a pill.

An alkaloid from opium (sometimes as much as 15% of), in white crystals, insoluble in water, soluble 1 in 3 of chloroform, 1 in 100 of 90% alcohol, 1 in 125 of ether, soluble also in benzol. An antiperiodic of great power,—analogous to, if not identical with, Quinine. Has been used in malaria and in sleeping sickness. Dose as above. *cf.* also Morphine Combination.

Synthesis of, —*vide* Perkin and Robinson.—Proc. Chem. Soc. 26 (1910), 46 and 131.

$\boxed{\text{P1}}$ **Narcotine Hydrochloride** PH. NED. V.

Dose.—1 to 3 grains (**0·06 to 0·2 Gm.**) White crystals soluble in water about 1 in 4.

$\boxed{\text{P1}}$ **Cotarnine Hydrochloride.** PH. NED. V. (P.G. VI. gives formula $C_{12}H_{14}O_3NCl + 2H_2O$) *Syn.* ✱**Stypticin** (T.M. 216872).

Dose.—¼ to ½ grain (**0·016 to 0·03 Gm.**) internally or hypodermically, in special cases up to 4 grains in 10% solution.

The salt of the base $\boxed{\text{P1}}$Cotarnine obtained by oxidising narcotine with manganese dioxide and sulphuric acid, in primrose coloured granular crystals, very soluble in water and alcohol. It was placed on the market by a British firm long before the Germans boomed it under the fancy name.—F. A. Hocking. M.pt. 125° C. (Dott). It is allied to Hydrastinine (*q.v.*).

The alkaloidal base Cotarnine is $C_{12}H_{15}NO_4.3H_2O$. The hydrochloride is not anhydrous, but loses water on drying, agreeing with the formula $(C_{12}H_{13}NO_3HCl)_2.5H_2O$.—D. B. Dott, C.D. i./26,7. Note P.G. VI. formula *antea*.

Uses.—In all forms of uterine hæmorrhage, useful in checking profuse menstruation. 1 to 2% may be used on a tampon.

Erysipelas, eczema and shingles may be treated with a 5% ointment.

Ⓟ**Tablets of Cotarnine Hydrochloride,** ¾ grain (0·05 Gm.).

ⓅOintment 2% with Unguentum Lanolini, in herpes and ulcerative balanitis. In more acute similar complaints up to 10% strength.

Ⓟ**Stypticin Wool,** 30% and Ⓟ**Gauze** are made.

Ⓟ**Urethral Bougies of Cotarnine** in cacao butter or gelatin contain ½ grain (0·03 Gm.), four inches long, and ⅛ inch in diameter, are used to check bleeding caused by sounds or catheters.

[P1]**Cotarnine Phthalate.** ✱STYPTOL (T.M. 253307).

$(C_{12}H_{15}NO_4)_2.C_6H_4COOH.COOH = 640·305$.

Dose.—¾ grain (0·05 Gm.), but much larger doses are given by some practitioners, *e.g.*, 10 grains without unpleasant effects, every 2 to 3 hours. Five grain doses suitable for mild cases.—George Foy.

An orange red body soluble in water. Contains 73% Cotarnine.

Ⓟ**Styptol Tablets** ¾ grain (0·05 Gm.).

Myristicin, the constituent of nutmeg, dill, and parsley oils, can be used as a starting-point for the synthesis of the base Cotarnine, and thence to produce styptol and stypticin.—Zeit. f. Angew, Chem , 1911,40. *Cf.* Hydrastinine, *Vol. II.*

NEBULÆ.

These are solutions for application to the throat and nose by the aid of a fine spray apparatus or atomiser. By means of a glass, metal or vulcanite tube, a jet of fine spray may be directed into the pharynx or nares, and if a deep breath be taken at the proper moment some of the spray will enter the larynx. The patient must be taught to carry this out personally. Nebulæ are aqueous, or of Liquid Paraffin, Almond Oil or Olive Oil. The following indications may prove useful :—

Antiseptic and Demulcent.—**Nebula Alkalina, Nebula Mucin,** *q.v.*

Antiseptic and Soothing.—(*a*) **Nebula Acidi Borici**—Glycerin of Boric Acid 1 drachm to the ounce; (*b*) **Nebula Potassii Permanganatis,** 1/10 grain in 1 ounce of Normal Saline; (*c*) **Nebula Acidi Tannici**—Glycerin of Tannic Acid 40 minims, Rose Water to 1 ounce.

Analgesic.—[𝔇] [P1] **Nebula Cocainæ Oleosa,** *vel* **Aquosa** *q.v.*

Asthma.—(*a*) **Nebula Anti-asthmatica "Compound Asthma Fluid"** *q.v.* and (*b*) Ⓟ**Nebula Lobeliæ Composita**—Lobelia Tincture, Belladonna Tincture, Stramonium Tincture, of each 10 minims, Ipecacuanha Tincture 5 minims, Pyridine 1 minim, Sodium Nitrite 10 grains, Glycerin and Rose Water to 1 ounce. (The pyridine is rather objectionable in taste.)

Astringent.—(*a*) Ⓟ**Nebulæ Zinci Chloridi,** 10 to 25 grains, with Rose Water 1 ounce; (*b*) **Cupri Sulphatis,** 5 grains to the ounce; (*c*) **Ferri Perchloridi,** *q.v.*; (*d*) **Hydrargyri Nitratis** (*q.v.*).

Diphtheria.—To dissolve membrane, **Nebula Acidi Lactici,** *q.v.*

Catarrh, Nasal, and congestive state of the Eustachian tubes.—[𝔇] [P1] **Nebula Cocainæ Composita**—Cocaine 2 grains, Cinnamon Oil 5 minims, Menthol 15 grains, Liquid Paraffin to 1 ounce. **Nebula Resorcini** 1%. **Nebula Antipyrini** 3%.

Catarrh, Dry.—(*a*) **Nebula Eucalypti**—Eucalyptus Oil 20 minims, Liquid Paraffin to 1 ounce; and (*b*) **Nebula Eucalypti Composita**; (*c*) **Nebula Mucin**, *q.v.*

Hay Fever.—(*a*) **Nebula Suprarenalis Extracti**, 5% and 10%; (*b*) **Nebula Quininæ**—Quinine Hydrochloride 10 grains, Glycerin and Rose Water to 1 ounce.

Phthisis.—(*a*) **Nebula Creosoti Composita**—Creosote 5 minims, Cassia Oil 5 minims, Almond Oil to 1 ounce; (*b*) **Nebula Iodi Composita**—Iodine 2 grains, Carbolic Acid 8 grains, Menthol 5 grains, Camphor 2 grains, Liquid Paraffin to 1 ounce. 2% Creosote may be added (if made with Almond Oil).

Stimulant.—(*b*) **Nebula Mentholis**, *q.v.*; (*b*) **Nebula Mentholis Composita**—Menthol and Camphor, 20 grains each, Cinnamon Oil 5 minims, Liquid Paraffin to 1 ounce; (*c*) **Nebula Potassii Chloratis cum Ferro.**—Potassium Chlorate 15 grains, Solution of Ferric Chloride 20 minims, Glycerin 1 drachm, Water to 1 ounce. (*d*) **Nebula Chlorbutolis Composita St. Th. H.**—Chlorbutol 15 grains, Camphor 40 grains, Menthol 40 grains, Cinnamon Oil 8 minims, Liquid Paraffin to 3 ounces.

For a common cold where *B. Septus* is the principal cause of infection, as spray and gargle Potassium Chlorate 10 grains, Solution of Ferric Chloride 15 minims, Glycerin 30 minims, and Water to 1 ounce, are useful. This is said to be of little value after 24 hours, when give a Potassium Chlorate gargle.

Tonic.—(*a*) **Nebula Pini Composita**, containing Pine Oil, Eucalyptus Oil, Cassia Oil, of each 5 minims, Menthol 5 grains in Almond Oil 1 ounce; also (*b*) 𝔅 𝔓1 the same, with Cocaine 1%.

For further formulæ, consult Index.

Intratracheal medication with a bent glass tube containing medicated oil.—A. R. Friel, B.M.J. i./22,149.

NITROGLYCERINUM, P. Jap.

$C_3H_5(O.NO_2)_3 = 227{\cdot}064.$

Syn. TRINITROGLYCERIN; GLONOIN; TRINITRIN; GLYCERYL TRINITRAS.

Dose.—$\frac{1}{200}$ to $\frac{1}{50}$ grain (**0·0003 to 0·0013 Gm.**) increased to $\frac{1}{10}$ grain.

Manufactured by adding Glycerin to Nitric and Sulphuric Acid mixed. A mixture of 3 parts by weight Nitric Acid Sp. Gr. 1·3 and 5 parts by weight of Sulphuric Acid Sp. Gr. 1·842 is used, and to nitrate 1 part by weight glycerin is added to 8 parts by weight of the mixture. By using Nordhausen Acid a yield of 230 per cent. of Nitroglycerin is obtainable.—Chem. News, Feb. 14, '08,74. See also P.J. i./09,160, and especially 'Explosives' by E. de Barry Barnett, 1919.

A useful account of manufacture of Nitroglycerin. The finished and washed Nitroglycerin is mixed with Siliceous Earth, *e.g.* Kieselguhr. This earth is used for its absorbent power in making Dynamite.—Alfred Nobel's discovery in 1866. Guncotton is made by mixing with cotton waste from the Lancashire spinning sheds. Other mixtures are known as **Gelignite** (containing 56·5%), **Samsonite**, **Saxonite** and **Carbonite** (25% with Potassium Nitrate 30, Barium Nitrate 4, Wood Meal 40, and Sodium Carbonate 1%).—R. R. Pirrie Pr., Feb. 1912,259.

Cordite—Stated to have composition Nitroglycerin 30, Nitrocellulose 65, Soft Paraffin 5. Method of making.—Na. July 28, 1910, p. 109. Eaten by soldiers, produces headache.

Nitroglycerin is a dense, opaque, white, oily liquid, transparent when dehydrated, and of Sp. Gr. 1·600. It has no odour, is slightly volatile, and has a sweet, aromatic, and pungent taste. It is slightly soluble in water, P. Jap III. gave 1 in 800, freely soluble in ether 1 in 6 of almond oil, freely soluble in absolute alcohol, and 1 in 15 of 90% alcohol. Nitroglycerin in fatty or oily solution is perfectly safe and stable, but in Alcoholic Solution the substance must be handled with the utmost caution.—*Vide infra.*

Uses.—Especially valuable in angina pectoris and generally to relieve dyspnœa of cardiac, pulmonary, or renal origin.

Nitroglycerin, in two minutes after taking a dose accelerates the pulse, relaxes the arteries, produces a feeling of fulness all over the body, but particularly in the head by a throbbing at the sides of the temples. It also causes headache, which lasts from 15 minutes to several hours, according to the quantity taken ; but to patients accustomed to its use the headache is not felt. In treating angina pectoris, neuralgia, asthma, headache, sea-sickness, and Bright's disease, its action is like that of amyl nitrite and the other nitrites, but its effects last much longer. For the weak heart of fatty degeneration and of old persons, this lessened tension proves valuable. It has been given in hæmoptysis.

Physiologically it belongs to the class of nitrites—probably, therefore, sodium nitrite is formed directly it gets into the blood.

Notwithstanding the effect on the vascular system by 1/1600 grain of Nitroglycerin (D. J. Leech) or a fraction of a minim of Amyl Nitrite, even large quantities of the medicinal preparations do not readily cause death.—R. R. Pirrie, Pr. Feb. 1912,259.

It is absorbed into the blood practically unchanged, hence its powerful and prolonged action (Brunton)—ex Pharmacol.

Physiological action of Nitroglycerin and the Nitrites. Formation of Sodium Nitrite in the blood (Matthew Hay). Gamgee's work on Methæmoglobin production. Observations of Haldane, Maghill and Mavrogordato on conversion of hæmoglobin into a mixture of Methæmoglobin and Nitric-Oxide-Hæmoglobin under the influence of Nitrites. Murrell's work on the effects of Nitroglycerin on the lower animals.—R. R. Pirrie, Pr. Feb. 1912,259.

Pharmacological action of Nitric Esters.—These bodies act mainly on unstriped muscle fibre and especially on that of the arterioles. The esters of the Monohydric Alcohols (Methyl, Ethyl, etc.) are relatively weak. Methyl Nitrate, for example, injected intravenously is more than ten times weaker than Nitroglycerin, and when given by the stomach more than 100 times weaker. The presence of OH groups (in the higher series) diminishes action as compared with the fully nitrated esters.—C. R. Marshall, B.M.J. ii./12,644.

Strychnine, Ergot and Belladonna are recommended to counteract the headache produced by large doses.

For further notes on treatment see References p. 579.

Injectio Nitroglycerini Hypodermica.

Dose.—1 to 4 minims (0·06 to 0·25 Cc.).

Nitroglycerin Solution 5, Alcohol (90%) 2, Distilled Water to 12.

Contains about $\frac{1}{240}$ grain in 1 minim. Acts promptly ; useful in collapse, &c., when the patient cannot swallow.

Tablets, Hypodermic, $\frac{1}{250}$ and $\frac{1}{100}$ grain.

Liquor Nitroglycerini, 1%. *Syn.* **Liquor Trinitrini** (*B.P.* '14).

F.E., P. Jap. III. (now omitted), **P. Hung., P.G. VI.**

Ph. Ned. V. gives direction for making direct from glycerin by nitration with Nitric and Sulphuric Acid mixture.

Dose.—½ to 2 minims (0·03 to 0·12 Cc.) gradually increased to 10 minims, if necessary, every 3 or 4 hours, in any aqueous vehicle.

Trinitroglycerin 1 part by weight, Alcohol (90%) *q.s.* to 100. Dissolve. Sp. Gr. 0·840. 110 minims contain 1 grain. A colourless neutral liquid; 10 Cc. with an equal volume of water keeps clear, but the further admixture of 1 Cc. of water causes opacity (presence of full proportion of Glyceryl trinitrate). Diluted further, the latter separates in oily drops, which explode when struck with a hammer. Should be kept from sunlight. A 5% and a 10% solution in absolute alcohol are also prepared commercially but are not safe for use in dispensing. (**Spiritus Glycerylis Nitratis, U.S.,** has 1% by weight.) U.S. cautions that violent headache may be caused when freely applied to the skin. A little caustic potash solution should be poured over it to decompose should it be accidentally spilled.

For the Assay of Nitroglycerin in Solutions, etc., see Vol. II.

Incompatibility.—Nitroglycerin is decomposed by caustic alkalis. The alcoholic solution is also precipitated by water in excess.

In asthma ½ to 1 minim doses with Spiritus Ætheris Nitrosi 20 minims every hour for 3 doses useful.—Haviland Hall, Tilley.

Haustus Nitroglycerini.

Nitroglycerin Solution 1 minim, Sodium Bicarbonate 10 grains, Compound Tincture of Cardamoms 1 drachm, Spirit of Chloroform 20 minims, Water to 1½ ounces. To be slowly sipped at first symptoms of an attack as restorative in angina pectoris.

Capsules (gelatin) of Nitroglycerin.

Dose.—1 or 2. Contain $\frac{1}{100}$ grain in oil solution or more or less as prescribed.

Tabellæ Nitroglycerini, B.P. 1885. *Dose.*—1 or 2.

Introduced by the late William Martindale in 1878, $\frac{1}{100}$ grain in each. These tablets have the nitroglycerin in solution in chocolate, 2½ grains, in a perfectly safe and inexplosive, stable and non-volatile, portable and palatable form. The small bulk, precise dose, and quick action, if well masticated and swallowed, render this mode preferable for administering nitroglycerin.

Additional Strengths of Tabellæ.

The tablets are also prepared containing $\frac{1}{75}$, $\frac{1}{50}$, and $\frac{1}{25}$ grain, and 1 milligramme respectively, for those accustomed to their use, as well as $\frac{1}{200}$, $\frac{1}{400}$, and $\frac{1}{600}$ grain in each, for administration to delicate persons and children, for whom this is a sufficient dose to ward off sea-sickness. The tablets appear to be non-poisonous even to children; a surgeon records that on one occasion two children, one three and the other six years of age, ate between them straight away two dozen, $\frac{1}{100}$ grain in each, without any injurious effects.

An employé in the author's laboratory (1905) ate a piece of the nitroglycerin mass weighing about 2 ounces, mistaking it for ordinary chocolate. A bad headache supervened, necessitating his lying down, but he was at work again the following day.

Single doses of 5 grains and *daily dose* of 20 minims of Pure Nitroglycerin tolerated.—B.M.J.E. ii./05,52.

Uses of Nitroglycerin Tablets.—One tablet every three or four hours to relieve or ward off attacks of angina pectoris, asthma, sea-sickness, neuralgia, headache, epilepsy, and may be tried for Bright's disease and dysmenorrhœa. In tinnitus aurium has been found useful. A dose of any preparation of nitroglycerin acts more promptly if taken on an empty stomach. In arterio-sclerosis patients are made more comfortable by small doses for a week or two.

In sea-sickness there is a cramp of the vessels and anæmia of the central nervous system. The tablets are of benefit—symptoms quickly alleviated. Repeated doses can be given with perfect safety.

Men on our battleships find them of service 'through the Bay.'

In asthma they are of immense value during a paroxysm, but it must not be forgotten the spasm may be of a compensatory nature and of value to the patient.

Should be carried about in the pocket to be taken immediately any pain comes on in the chest. These not only relieve pain but lessen the dangerous condition of which the pain is a symptom.

Tabellæ Trinitrini, Trinitrin Tablets (*B.P.* '14).

Tablets of chocolate, each weighing 5 grains (**0·3 Gm.**), and containing $\frac{1}{130}$ grain (**0·0005 Gm.**). *Dose.*—One or two tablets.

Tabellæ Nitroglycerini et Caffeinæ.

Dose.—1 every 4 hours or as required—each containing $\frac{1}{100}$ grain Nitroglycerin and 1 grain Caffeine; for use in migraine.

P1 Tablettæ Nitroglycerini et Sodii Iodidi cum Arsenio. *Dose.*—1 in every four hours. Each equivalent to Nitroglycerin $\frac{1}{50}$ grain, Sodium Iodide 15 grains, with Fowler's Arsenical Solution 2 minims. This dosage may be considered a routine treatment of aortic disease. The quantity of Nitroglycerin employed is frequently too low, but the above may be given with perfect safety.

P1 Tabellæ Nitroglycerini $\frac{1}{150}$ **grain (0·0004 Gm.) et Strychninæ** $\frac{1}{25}$ **grain (0·0025 Gm.).**

Also { Nitroglycerin $\frac{1}{120}$, $\frac{1}{100}$, $\frac{1}{100}$ grain with
Strychnine $\frac{1}{20}$, $\frac{1}{50}$, $\frac{1}{100}$ grain

In migraine Nitroglycerin, especially if in combination with Strychnine, is of value. It relieves headache almost immediately. Its vasodilator effect lowers blood pressure in the peripheral vessels, and so reduces cerebral and arterial pressure.

In high arterial tension where the heart is beginning to fail and such symptoms as irregularity of pulse, giddiness, shortness of breath, or even œdema of ankles begin to appear, Brunton advised to combine cardiac tonics with Vasodilators. Rest is of utmost importance.

Tabellæ Nitroglycerini Compositæ.

Contain Nitroglycerin $\frac{1}{100}$ grain, Amyl Nitrite $\frac{1}{4}$ grain, Menthol $\frac{1}{50}$ grain, Capsicum $\frac{1}{100}$ grain.

Ⓟ**Tabellæ Anti-Asthmaticæ.** (H.).

Dose.—1 to 4 thrice daily.

Nitroglycerin $\frac{1}{200}$ grain, Sodium Iodide 2 grains, Potassium

Bromide 2 grains, Fluidextract of Euphorbia Pilulifera 3 minims, Tincture of Lobelia 4 minims.

Very useful in asthma ; the nitroglycerin depresses the peripheral ends of the vagus nerves and stimulates the heart by removing the inhibitory action of the vagus and relieving blood vessels elsewhere.

Ⓟ**Tabellæ Digitalini et Nitroglycerini** *aa.* $\frac{1}{100}$ grain are also prepared *v.* Digitalin.

Tabellæ Nitroglycerini 1/100 and 1/200 grain **et Thyroidei Sicci** (Standardised—*Martindale*), ½, 1½ and 3 grains combine the action of these two remedies.

References to use of Nitroglycerin.

Blood Pressure in Man.—

Maximum pressure at various ages in men, women and children. From 8 to 14 it is about 90 mm., from 15 to 21 it is 100 to 115 or 120, from 21 to 65 from 100 or 125 up to 135 or 150, above 65 it may still be 135 to 150 or up to 200 or higher. In women it is about 10 to 15 mm. lower than in men. In athletic men it may be about 10 to 15 mm. higher than in moderate development. The cases in which low tension, below 100 in men and 80 or 90 in women generally are (1) weakness after some illness, especially in influenza (2) in commencing phthisis, (3) in heavy smokers.

In *lowered pressure* abundant food (animal), meat extracts, tonics as Iron, Arsenic, Malt, Cod Liver Oil, Hypophosphites, Glycerophosphates, and as cardiac tonics, Strychnine, Strophanthus, Digitalis and Caffeine are advised.

In Raised Tension.—High tension, especially in advancing age, though giving rise to sense of power and desire for action both physical and mental, may be a danger signal. It is not only a direct cause of cardiac failure or ruptured vessels, but produces atheroma of the arteries, and thus weakening them renders them liable to break. By detecting the rise in time in middle life, tension may be kept down, changes in the arteries leading to arteriosclerosis and atheroma may be prevented, and life prolonged.

Nicotine is almost the only drug which nearly equals Adrenalin in power of raising blood pressure. Tobacco, tea, and coffee must be prohibited.

Mercurials are beneficial, ½ grain or 1 grain of Calomel, or 3 to 5 grains of blue pill once or twice a week, followed by Saline. Potassium Iodide, in dose of 1 to 10 grains thrice daily useful. The Hippurates, Sodium Benzoate, Sodium Nitrite ½ grain, gradually increased to 4 or 5 grains, as also **Pulvis Sodii Nitritis Compositus**, *q.v.*, all tend to keep pressure down. **Nitroglycerin** and **Erythrol Nitrate** act similarly. A doctor was able to keep himself free from attacks of angina by daily use of Erythrol Nitrate for 3 or 4 years, beginning with ½ grain thrice daily, and gradually increasing it. When the pain is acute, **Amyl Nitrite** is the quickest means of relieving, or a little Chloroform as inhalation.

The influence of TOBACCO SMOKING as cause of arteriosclerosis is, however, not settled. Clinical writers are disposed to admit Tobacco as at least a predisposing cause, though many deny it.—F. W. Andrewes.

MYXŒDEMA has been treated with $\frac{1}{50}$ grain doses with purgings. In PUERPERAL ECLAMPSIA it is strongly recommended. Lowers blood pressure, and increases amount of urine. In epileptic vertigo, small doses relieve.

GASTRIC ORIGIN OF ANGINA PECTORIS.—In certain favouring circumstances, tension of the gastric atmosphere is associated with painful attacks indistinguishable from those of angina pectoris. A case of flatulent dyspepsia developed seizures of a painful kind—in the upper intercostal nerves including the costo-humeral branch. Nitroglycerin effective—seizures always subsiding immediately.—B.M.J. i./11,613.

To reduce the vascular-tension in cirrhosis of the kidney.—Tirard.

MORPHINE CRAVING relieved.—L. i./09,1334.

In LOCOMOTOR ATAXIA may be given for long period, in increasing doses, relieving the crisis and lessening the pain.—B.M.J. ii./07,1823.

PAROXYSMAL TACHYCARDIA; it is *the* treatment.—B.M.J. ii./04,109.

MENTAL DISEASE.—In certain cases depending on cerebral anæmia from vaso-constriction, Nitroglycerin produced rapid cure.—M.A., 1908,37.

PULMONARY HÆMORRHAGE.—The action of Nitroglycerin on pulmonary circulation does not justify its use and experimentally it appears to be contra-indicated in hæmoptysis.—Per Jl. A.M.A., ii./25,929.

SUBACUTE NEURITIS, a case of, with general dropsy. Nitroglycerin in small doses increased the quantity of urine, and the dropsy disappeared completely in ten days.—B.M.J. ii./08,1670.

CARBON MONOXIDE POISONING.—$\frac{1}{100}$ grain injected, together with inhalation of Oxygen advised.—Pr. Dec. '08,842.

ACUTE LOBAR PNEUMONIA.—Found to aid the action of Digitalis in cases with cardiac weakness—10 minims of Tincture of Digitalis with $\frac{1}{2}$ minim of solution of Nitroglycerin every three or four hours. Especially indicated when the renal secretion is scanty, and the urine contains more than the usual trace of albumin.—Yeo.

CHOREA.—Nitroglycerin may be given in full doses, and, if necessary, Morphine.

SLEEPLESSNESS, where psychic or somatic excitement is the cause, endeavour to reduce the reflex excitability of the cord or lower arterial tension by Nitroglycerin or Bromides.—B.M.J. ii./13,1209.

Wounds caused by N.G. explosion; of peculiar churned-up and softened nature probably caused by the escape of internal body pressure into the vacuum caused by the explosion.—J. L. Thomas, B.M.J. i./16,89.

ACUTE TUBULAR NEPHRITIS ACCOMPANIED WITH DROPSY.—Nitroglycerin is valuable as in the following:—Trinitrin Solution, 32 minims, Potassium Acetate, 5 drachms, Compound Cardamom Tincture, 4 drachms, water to 8 ounces.

Dose.—$\frac{1}{2}$ ounce in water every three hours, until symptoms abate, and then thrice daily. Iron tonics to be given so soon as the urine is albumin-free. —J. T. Maclachlan, B.M.J. ii/23,473.

HIGH BLOOD PRESSURE.—Salines, exercise, Sodium Nitrite in 3 or even 5 grain doses, several times daily with a diuretic or diaphoretic. Amyl Nitrite or Nitroglycerin for temporary effect—should not be used too early. —J. Henderson, Glas. Med. Jl. Apl. '23,209, B.M.J.E. i./23,81.

A female *æt*. 47, melancholic in nature, for two years had an attack of hemiplegia, evidently hæmorrhagic, blood pressure rose to 170—180 mm. This was successfully reduced to 110—120 mm. by purging daily, and by Nitroglycerin and suitable feeding. Mental symptoms disappeared.—B.M.J. ii./11,1472.

High blood pressure. A Trinitrin tablet, in some cases, helps patient to sleep.—Sir H. Rolleston, L. i./23,521.

SEA-SICKNESS. Recommended.—A. Sellheim, B.M.J. i./28,244.

Methyl Nitrate which is soluble in water to extent of 1 in 30 at 20°C., is 100 times less powerful than Nitroglycerin when given *per os*, and when given into the blood stream is about 15 times less.

NUTRIMENTA.

For a **classification** *of Foods, a consideration of* **"Amino Acids,"** *the* **Biuret Reaction** *for Albuminoids,* **Yeast Extracts** *as Foods,* **Milk Preservation, Bread** *and* **Flour Standardisation,** *the* **Bleaching of Flour,** *and* **Injurious Admixtures to Flour** and other theoretical matters.—*See Vol. II.*

Preparations of Meat and Blood.

Meat Extract is the product by extracting fresh meat with boiling water and evaporation. **Contains not less than 75%of total solids. It should be practically free from Albumin. The yield from meat is about 3%.**

Fluid Meat Extract is identical with above prepared by Liebig's original process, except that it is evaporated at lower temperature and contains not more than 75 and not less than 50% of total solids.

Meat Juice is the fluid portion of muscle fibre obtained by pressure or otherwise and may be concentrated at a temperature below the coagulation point of the soluble proteins. The solids contain not more than 15% Ash, not more than 2·5% NaCl (calculated from total Cl), not less than 12% N., not more than 4 or less than 2% P_2O_5. The nitrogenous substances contain not less than 35% coagulable proteins and not more than 40% meat bases.—Allen, 1914, Vol. VIII., p 390.

"Some Meat Extracts are fortified by additions of meat fibre, blood, albumin, and other nutritious constituents, but they cannot even now be ranked as true foods, for no one could eat sufficient of them, owing to the small quantity of Proteins present and the large amounts of extractive and mineral matters. The amounts of such meat fibre and albumin that it is possible to add to Meat Extract are relatively small and can make little difference to the food value of the preparation. The white of one egg contains as much nutritive matter as three tablespoonsful of any of these meat preparations (R. Hutchinson)."—A. R. Tankard, P.J. ii./11,72.

Nutritive effects of Beef Extract. It was found both on man and dog that the addition of beef extracts (commercial and home-made) to the diet led to an increase of body weight. Accompanying this was a retention of a considerable portion of the nitrogen given in the extracts. The extracts caused a reduction in the output of Nitrogen by the fæces.—this no doubt being due to the better digestion and absorption of food of the ordinary diet,—hence the extracts may be accredited with both a direct and indirect nutritive value.—W. H. Thompson, W. Caldwell and T. A. Wallace. The question was raised as to whether the effects were not due to stimuation of gastric secretion.—B.M.J. ii./11,613, *et seq.*

"A meat extract is a preparation (involving the use of heat, usually 70° C. by repeated extraction) of the soluble matters of lean beef: it consists chiefly of the nitrogenous extractives of flesh—creatine, creatinine and other meat basis, the non nitrogenous extractive matters, mineral matters varying quantities (usually small) of true Protein substances (Albumin, Albumoses and Peptone), Gelatin and Water. Creatine and its allies are products of metabolism of protein and possess no food value. Gelatin has no nutritive value and the nutritious constituents of meat extract are therefore confined to the proteins, *i.e.*, the albumins and their immediate products of digestion. By far the larger number of true meat extracts contain at most only traces of proteins."—Tankard, P.J. ii./10,407; ii./11,72. See also P.J. ii./10,430.

✱ **Bovril** (T.M. 270031, 58405, 76548, 76549, 76860, 76861, 78304, Class 42, also 60501, Class 3.)

A combination of beef extract and finely powdered beef fibrin and albumen.

widely used as a substitute for ordinary beef tea. Bovril was the commercial extract used in the investigation into the "nutritive effects of beef extract" referred to above.

Concentrated Beef-Tea.

A firm jelly, in tins and skins, contains the natural gelatin of the meat, and, diluted, forms a nutritious substitute for true beef-tea.

***Meat Juice** (Brand's.—T.M. 25133, 303834, 441983, 442278, Class 42).

A teaspoonful in a wine-glassful of water is a useful pick-me-up. Is prepared by cold process resulting in retention of full activity of juice of the raw beef.

***Ferrocarnis** (T.M. 346870).

Dose.—One teaspoonful in water thrice daily with meals.

Described as a flavoured solution of iron in organic combination with concentrated raw meat juice. An Iron Tonic food.

Essence of Beef.

A soft, transparent, amber-coloured jelly, prepared from beef by exhausting with tepid water. It is agreeable to the palate and stomach of a delicate invalid; is useful in allaying obstinate vomiting. It is best taken cold by teaspoonsful. Similar essences are made from **mutton** and **chicken.**

Meat jelly is suitable for ulcerated stomach. Gelatin is a powerful protein sparer, easily digested, and fixes a great deal of acid.

Beef, Chicken, Mutton and Veal Peptones, are also prepared.

Restorative Essence of Beef is made from fresh beef, freed from fat, finely chopped up—1 pound mixed with distilled water 8 ounces; add 5 drops of hydrochloric acid, and 60 grains or less of salt; stir well and allow to macerate for 3 hours; strain. The product has an agreeable taste, and should be taken cold. *Dose.*—A wineglassful or more (Ringer). It is also prepared *Peptonised* by digestion with pepsin at the body temperature.

These are best freshly prepared for the patient, but may be preserved a reasonable time by addition of formalin or chloroform.

Beef and Malt Wine.—Extract of Beef 4 ounces, Extract of Malt 8 ounces, Port Wine 1 gallon (Ph. Form.); or a Meat Juice and Liquid Extract may be used instead of the solid extracts.

A 'Beef and Malt Wine' should contain at least 0·18% of Nitrogen and Phosphorus equivalent to 0.12% of Phosphorus Pentoxide. Of 12 samples none contained these amounts.—B.M.J. i./24,919.

Further wines are mentioned in the Proprietary Medicine Chapter, *Vol. II.*

Meat Juices, Liquor Carnis and others.

Dark, reddish-brown liquids consisting of the expressed juice of meat concentrated at a low temperature *in vacuo.* A teaspoonful is added to 3 tablespoonsful of cold or tepid water, and taken in tablespoonful doses or more for sickness or exhaustion. Hot water coagulates the albumen.

Hæmoglobin. *Dose.*—1 to 2 drachms (**4 to 8 Gm.**).

$C_{600} H_{960} N_{154} Fe S_3 O_{179}$ (?) = 13339·944.

The principal constituent of red blood corpuscles. Is supplied commercially in reddish black powder or of extract consistence or in scale form. May be given according to condition in cachet, capsule, or mixed with wine. It is useful in ordinary secondary anæmia. Hæmoglobin solution gives a characteristic absorption spectrum and contains in organic combination iron equal to about ½%. *Cf. Vol. II.* for estimation in the blood and further details. It combines readily with oxygen, forming **Oxyhæmoglobin,** which is the substance known in trade as hæmoglobin.

In the arterial circulation, hæmoglobin is present as oxy-hæmoglobin (brilliant red in colour) the oxygen of which is given up to the tissues in its course, returning de-oxidised (dark-red) to the lungs by the venous system where it is ready to take up fresh oxygen and so continue the process.

Hæmoglobin Capsules. Contain 5 grains (**0·3 Gm.**).

Elixir Hæmoglobin. *Dose.*—1 drachm (4 Cc.) or more.

Hæmoglobin 10, Water 15, Aromatic Syrup (carefully neutralised), *q.s.* to 100 (approximately 5 grains in 1 drachm). An agreeably flavoured preparation of hæmoglobin as hæmatinic.

Elixir Hæmoglobin cum Lecithin.—*Dose.*—1 to 2 drachms. As above with 3 grains of Lecithin per drachm added.

Nutrient Powder (Brand's).

On bread and butter or mixed with other food is very palatable—it retains the nutritive value of fresh meat.

∗**Herogen** (T.M. 372251).—*Directions.*—Two teaspoonsful in a breakfast cup of warm milk and water.. For children half the amount of Herogen.

Contains the essentials of lean meat, milk, cereals, malted grain, and eggs, combined in suitable proportions and sterilised to form a complete and well-balanced food. A nutrient to the nerves and tissues, and as a general restorative.

Albumin Ovi Siccum, Ph. Ned.V., P. Jap. III. (now omitted).

Dose.—*Ad lib.* The molecular weight of albumin has been given as approaching 14,000. Yellowish, transparent, horn-like pieces obtained by evaporating white of egg at not exceeding 50° C. (the fresh white of egg is used as antidote in case of poisoning by mercurial and copper salts). Should be easily soluble in about 10 parts of water, producing a neutral solution. Insoluble in alcohol and ether.

Incompatible with mineral acids, alcohol, mercuric chloride, tannin-containing preparations.

In hyperchlorhydria and in nervous disorders egg albumen is a food which binds and neutralises Hydrochloric Acid.

Albumin Water, for infantile diarrhœa and invalids in general. White of one egg mixed with Sterile Water 8 ounces, Sodium Chloride 5 grains or *q.s.* and a little whisky or brandy added.

New Emulsifying agent for essential oils.—The following was found to be efficient: Egg Albumin powdered 1, Cream of Tartar 4.—P.J., ii./25,521.

Emulsifiers.—J. Cofman-Nicoresti, P.J., ii./26,350,369.

Albumin Sanguinis.

Dose.—*Ad lib.* Made by inspissating blood serum. Brown horn-like scales, not so soluble in water as Egg Albumin.

Milk Preparations

For Milk Analysis vide Vol. II.

Infant Feeding.

The Enzymes in fresh human milk are Catalase, Amylase, Butyrase, Lipase and Peroxidase while cows' milk contains, in addition, Perhydridase. We summarise the action of these and other Enzymes in a Table, see *Vol. II.*

'Upper Milk Feeding' for infants and invalids commends itself for certain reasons 'Upper Milk' consists of the upper portion of milk that has stood in a cool place until a cream layer has formed. By diluting with water, or with water and whole milk, mixtures are obtained containing a high percentage of fat with a normal percentage of proteid. Upper milks are much superior to cream mixtures for feeding—the fat percentages are more uniform and the dilutions do not so readily separate as those employing cream.

Dried Milk.

Manufacture.—By spraying milk in a current of hot air or by heating over revolving cylinders. Hygienically and dietetically dried milk should be good. It is superior to condensed milk in protein and fatty matter.—S. Delépine.

Public Health (Dried Milk) Regulations 1923 *govern content of Milk Fat—vide Vol. II.*

Dried Milk is much used for **Infant Feeding.** The '**Half Cream**' Milk is preferred by some authorities for the purpose, as being less rich—indeed a healthy child has been reared on *Dried Separated Milk.* This contains perhaps only 1% fat. Obviously if a child is capable of digesting the *full cream* variety it should have it in preference. *B. Tuberculosis* and all other bacteria are killed in the process of desiccation. For infant feeding and general use are :—

Dried Full-cream Milk (with all its original cream) is reconverted into milk by mixing 2½ ounces (5 heaped tablespoonsful) with 1 pint of hot water. To re-convert

Dried Half-Cream Milk (with half its original cream), employ 2¼ ounces (5 tablespoonsful) to the pint of hot water.

Dried Separated Milk (containing 1% of its original butter fat), employ 2 ounces (4 heaped tablespoonsful) to the pint of hot water.

In Feeding Trials with the Dried 'Full' and 'Half' Cream Milk on infants of the poorest class in London, diarrhœa was practically absent throughout. Roughly 1 of powder to 7 of water is the strength of food to start with.

TABLE OF FEEDS.

	Age of Infant.	Intervals of Day Feeding.	No. of Night Feeds.	Boiling Water.	Dried Milk.
The milk in the bottle to be shaken occasionally whilst feeding, as the fat separates. No food to be kept over.	1 week	3 hourly	1	1 to 1½ ozs.	1 measure (holding about 1 dr. weight)
	2 to 3 weeks	3 ,,	1	2½ ozs.	2 ditto
	4 to 5 weeks	3 ,,	1	3 oz.	2-2½ ,,
	6 to 12 weeks	3½ ,,	1	4 oz.	3-3½ ,,

And so on in about same ratio.

The milk is more easy of digestion,—as seen in the case of infants recovering from acute diarrhœa. These are often unable to take fresh milk even in extreme dilution without recurrence of diarrhœa, yet can digest comparatively concentrated mixtures of dried milk. Get the child back again on cows' milk gradually. A teaspoonful or less to be added to the Dried Milk at first, and increased.

Mistakes in the artificial feeding of infants. Attention is drawn to errors regarding table—and teaspoonsful in measuring dried milks. A level tablespoonful of Glaxo or Cow and Gate Milk is about 3 drachms. A teaspoon holds little more than a drachm.—Eric Pritchard, B.M.J., ii./26,549.

For infants, Milk in preference to Patent Foods. If Milk is cooked or pure dried Milk be used, fresh fruit juices or raw meat juice must supplement.—From a lecture on Infantile Scurvy by T. D. Lister.

Disadvantages of Dried Milk in infant feeding. *Rickets common.* Babies often decidedly anæmic.—J. Burnet, Pr. Mar. 1921.

Good standard Dried Milk corresponds to the 3% Standard of the Board of Agriculture and Fisheries. Where pure cow's milk is unavailable Dried Milk is a reliable substitute.—R. J. Blackham, Pr. May, 1921.

Protein balance in infant feeding. Combat of the idea that infants will not thrive on cow's milk unless they are given two or three times as much protein as is contained in woman's milk.—E. Pritchard, L. ii./22,44 ; see also R. Carter, *ibid* 99.

NATIONAL MILK CONFERENCE, speakers in general in favour of Dried Milk.—L. ii./22,930.

Milk dried by the ***roller process*** has a greater amount of antiscorbutic vitamin than spray-process milk.—E. Mellanby, B.M.J. i./24,895.

Dried milks found to vary in Vitamin B content, which may be slightly greater or slightly less than that of fresh milk, the variation not depending on methods of manufacture.—J.C.S., Ai./25,751.

Dried milk found to approximate more closely fresh cows' milk than evaporated (condensed unsweetened) milk.—G. A. Hartwell, B.M.J., i./25,1073. *See also* C. Maddock, B.M.J., i./25,1153.

Human Milk, Artificial.

New Milk 30, Cream 1¾, Milk Sugar 1⅛, Water 18.

COW'S MILK, MODIFICATION TO BREAST STANDARD. The following formula is given:—Milk (of average quality) 10 ounces, Cream (33%) 1 ounce (or Cream 48%, ¾ ounce), Sugar (Milk Sugar at first, but later Milk Sugar, Maltose and Cane Sugar mixed) 1 ounce, Broth 4 ounces, water to 1 pint. The addition of broth has been found good.—E. Pritchard, L. i./22,838.

Humanised Milk.—CAN. FORM.

Triturate 100 grains of a mixture of Pancreatin 7, Sodium Bicarbonate 28, and Milk Sugar 965,—with Water 2 ounces and transfer to a bottle containing cows' milk 2 ounces, and cream ½ ounce. Immerse this in water heated to 38° C. for ¼ hour. Afterwards bring to the boil.

Human Milk has the average composition:—Fat 3·4%, Milk Sugar 6·4%, Albuminoids 1·7% (Casein and Lactalbumen, *cf.* p. 588), Mineral Matter 0·2%. Notice the difference between the human milk and cows' milk (*Vol. II.*) in the relationship between the albuminoids and the mineral matter.

According to a further investigation, it contains on the average more lactose much less protein, and a greater percentage of substances of unknown nature with little or no Nitrogen in their composition. From beginning of the second month of lactation onwards the composition is:—

Fat 2 to 4%, Lactose 6 to 7·5%, Protein 0·7 to 1·5%.

Cow's Milk:—Fat 2 to 4%, Lactose 3·5 to 5%, Protein 2·5 to 4%.

The unknown substances are important constituents in diet. They are soluble in Alcohol and Ether—they are in greater abundance in human milk during the early periods of lactation. At this time they may be 1%, falling to half the amount from the middle period of lactation. In cow's milk they are about 0·3% from the middle period.—Jl. Biol. Chem., Oct., 13, per B.M.J. ii./13,1499.

The more nearly the proteins of food approximate in structure the tissue proteins the more completely satisfactory and easy of utilisation will they prove to be—this is, of course, of special importance to the newly-born infant with imperfectly developed digestive ferments. Mother's milk is an optimum diet at that period of life; no substitute can be produced for this. The constituents of cows' milk may be re-arranged to make them present in proportions almost exactly similar to those in breast milk, but, however completely we may humanise cows' milk, it is not in our power to make it human, nor to give to its proteins the peculiar stamp of specificity.—A. E. Garrod.

Caloric bases of milk mixtures. The vast majority of milk mixtures used in infant feeding are as unlike human milk as they are unlike unmodified cows' milk.—G. F. Powers, per Jl. A.M.A., ii./25, 1511.

Humanised Milk liable to produce diarrhœa in infants.—L. i./24,867.

National Milk Conference.

Variations in chemical composition of milk. Morning milk of ten cows during a fortnight only reached 3% of fat once, while the evening milk was generally in excess of 4%.—B.M.J. ii./22,820.

If artificial feeding has to be resorted to, healthy cows' milk should first be tried; that known as '**Certified**,' or else '**Grade A**' (**Tuberculin Tested**) may be more relied on than ordinary milk supply. As a general rule dilute with equal quantity of water. A grain of **Sodium Citrate** to the ounce will increase digestibility (5 and 10 grain **Tablets** are prepared *q.v.*), Milk Sugar, a drachm to the pint, is also a useful addition. Fresh Milk is better than Pasteurised, but in case of doubt Pasteurisation or the use of **Dried Milk** (*q.v.*) or Condensed Milk (containing not less than 13% fat) should be considered. Of the last mentioned use 1 teaspoonful of the sweetened variety to 3 ounces of water, adding 1 teaspoonful of cream. (Condensed Milk should not be given after the child is 4 months old.)

***Graded Milk** is dealt with in Vol. II.*

The action of Sodium Citrate in preventing milk clotting has not been thoroughly explained.

Sodium Citrated-Milk (2 grains to the ounce) makes whole milk feeding possible and removes necessity of diluting. Results equal to natural milk. —C. W. Vining, B.M.J. ii./15,457; see also R. D. Rudolph, *ibid*, p. 660.—Strongly in favour of undiluted milk heated in a jacketed pan for 40 minutes as advised by Budin, with addition of Sodium Citrate.

If none of the above are digested, **Peptonised Milk** must be given employing **Peptonising Powders** or **Liquor Pancreaticus** (*q.v.*). **After the child is six months old** a Malted Food may be given as a supplementary food, *but farinaceous foods of all kinds should be discouraged until the child has teeth.*—R. Hutchinson.

Infants' Food 'A' for children up to three months contains all the Milk Solids prepared with antiseptic precautions. Three to five heaped tablespoonsful to be added to a pint of water which has been brought to the boil (and kept boiling for fifteen minutes), and allowed to cool down slightly in a covered jug. When mixed for use, it is similar in composition to human milk,

FOOD TIME TABLE.

Age of Child.	1 week.	2 to 3 weeks.	4 to 5 weeks.	6 to 12 weeks.	3 to 5 months.
To be fed during the day every	3 hours	3 hours	3 hours	3 hours	4 hours
During the night	Once	Once	Once	Once	Once
Quantity of "A" Food to use for each meal (the amounts may be increased somewhat if digested).	1 to 1½ full-sized teaspoons	1½ to 3 full-sized teaspoons	2½ to 3½ full-sized teaspoons	3 to 4 full-sized teaspoons	4 to 5½ full-sized teaspoons
Quantity of Water for each meal	2 to 3 tablespoons (1 to 1½ ozs.)	3 to 6 tablespoons (1½ to 3 ozs.)	5 to 7 tablespoons (2½ to 3½ ozs.)	6 to 8 tablespoons (3 to 4 ozs.)	8 to 12 tablespoons (4 to 6 ozs.)

For bacteriological reasons and owing to the fact that the milk fat will rise to the surface on allowing to stand for a few hours, a sufficient quantity only for use at the time is to be prepared in order that the Food may be as fresh as possible at the time of administration.

Food 'B' for Infants (from three to six months) **and Invalids** contains the milk solids with a small proportion of cereal carbohydrates treated to render them assimilable. Prepared for use as the latter.

Food 'C' for Infants (from six months and upwards) **and Invalids** similar to 'B' with a larger proportion of farinaceous constituent. Five heaped tablespoonsful to be used to the pint of water as above.

Cocoa Food is also prepared.

Biscuit Foods.

Biscuit Powder 1½ lbs., Baked Wheat Flour 1 lb., Finest Ground Oatmeal 6 ozs., Milk Sugar 6 ozs., Powdered Malt 8 ozs., dried at a low temperature and mixed

A better way is to bake into a biscuit the mixture of wheat flour, fine oatmeal and milk, then grind up and mix with the powdered malt.

Another formula is :—Baked Flour 1 lb., Biscuit Powder 1 lb., Refined Sugar in powder 1 oz., Milk Sugar 6 ozs., Finest Oat Flour 8 ozs., Powdered Malt 4 ozs.—**Note Hutchinson's remarks, p. 586.**

Malted Foods described.—B.M.J i. 10,86.

Pasteurisation of Milk.—So-called "sterilising."

The two principal methods employed are (1) the *Flash Process*, in which the milk is usually distributed by centrifugal force round the inner surface of a cylinder at a temperature of 72 to 84° C., and (2) the *Holder Process*, in which the milk is maintained at about 65° C. for half an hour and then rapidly cooled. Above 65° C. deleterious changes occur. This method is usually regarded as the most reliable. The consensus of opinion is that few tubercle bacilli survive 60-65° C. for 30 minutes and those escaping destruction have their virulence impaired.

Ministry of Health Order, 'Milk (Special Designations) Order, 1922.'—PASTEURISED MILK must have been heated at a temperature of 145° to 150° F. for ½ hour and then cooled to 55° F.

The 'Flash' method of pasteurising is entirely replaced in U.S.A. by the 'holding' method in which the Milk is kept at 145° F. for 30 minutes.—L. ii./22,930.

Amongst the diseases for which milk acts as a vehicle are tuberculosis, diphtheria, typhoid fever, paratyphoid fever, dysentery, scarlet fever, Malta fever, infective sore throats, epidemic diarrhœa, cholera and food poisoning, and less frequently foot-and-mouth disease and anthrax.—W. G. Savage, B.M.J., ii./25,244.

Complete safety from milk infection is impossible unless milk is rendered sterile of pathogenic organisms immediately before consumption, *i.e.*, by home pasteurisation or scalding. For relative safety, commercial pasteurisation is the only solution.—E. Pritchard, B.M.J., ii./25,245.

Pasteurisation of milk is of advantage to the dairyman rather than to the consumer. On keeping raw and Pasteurised milk, the bacterial count in the latter found far greater than in the raw milk. As to antiscorbutic properties, Plimmer has shown that re-heated Pasteurised milk contains none.—T. McLachlan, L. ii./26,878.

For further data on Pasteurisation, especially with regard to B. tuberculosis, see Vol. II.

Sterilised Milk.—The usual procedure is to raise just to boiling in 40 to 50 minutes and maintain for half an hour, then rapidly cool. Marked changes take place in the cream line. Sterilised Milk not good—children may become anæmic. Gain in weight of a child is not everything—not necessarily progress in development. Scalded milk and water, equal parts, every 2½ hours, brought a child up to normal after it had sampled four kinds of food and two milk mixtures.—Burnet.

Probably the essential factor in a case of infantile scurvy was the *prolonged sterilisation or boiling of the milk.*—The danger from milk which has only just been raised to the boiling point for a very short time seems fortunately to be infinitesimal.—L. i./11,662.

Antiscorbutic value of Cow's Milk. Investigation at Lister Institute.—B.M.J. ii./19,681.

Boiled versus Unboiled Milk.—Experiments on animals fed with milk of another species. Such small differences as were found in the nutritive values of raw and boiled milk were in **favor of boiled milk**.—L.G.B. Report.

Milk boiled at home for 2 to 5 minutes is in every way to be preferred to fresh or commercially pasteurised milk.—J. Brennemann, J.Am.Med.Ass., 1916,67,1413, per P.J. i./17,23.

Milk containing **Lactic Acid 0.5%** was a satisfactory routine food in the majority of 50 infants aged from 1 day to 6 months in which it was tried. The advantages claimed are ease of preparation, relative sterility, and greater digestibility and caloric value. It should not be used in cases of anhydræmic acidosis until the acidosis has been overcome.—J. A. Stephen and E. R. C. Walker, L. ii./27,65.

Condensed Milk standardised under Ministry of Health (L. i./23, 972, ii./23,529. *Further Data from Food Investigation Board*, see Vol. II.), Labels to state clearly the types. The composition to be :—

		Percentage Milk Fat.	Percentage of all milk solids, including Fat.
Full cream unsweetened	..	9·0	31
,, ,, sweetened ..	..	9·0	31
Skimmed unsweetened	..	—	20
,, sweetened ..	..	—	26

'Berna' Condensed Milk contains apparently less cane sugar than the average, hence Fat content correspondingly higher.—Pr. Mar. 22/227.

INFANT FEEDING IN THE TROPICS.—In the absence of breast feeding Dried Milk or a good brand of Condensed Milk is best.

In gastro-enteritis stop milk feeding and give nothing but warm albumen water in large quantities (20 to 40 ounces containing the whites of 3 or 4 eggs) according to age of child during 24 hours. Castor Oil a few drops. In dysentery stimulants are not to be used. Intestinal injections, Boric Acid Simaruba, etc., essential.—B.M.J. ii./09,770.

Are infants capable of digesting foods which contain starch? Infants from birth secrete an amylolytic ferment. The glands, notably the pancreas, can be trained by a starchy diet to secrete more. This can be begun shortly after birth in the case of bottle-fed infants. **Barley Water** contains about 2% of starch. Mixed with an equal quantity of milk, this is beneficial, encouraging the growth of lactic acid bacilli and the formation of lactic acid, thus preventing the growth of proteolytic bacteria. Commence with a milk mixture containing not more than 0·5% of starch, and gradually increase the amount very slowly up to 3 to 5%. If the stools become very acid, or if they give a distinct starch reaction, the percentage of starch in the diet must be reduced.

Milk contains more calcium than lime water. Milk is, therefore, of value in hæmorrhage—where it is desirable to increase the calcium in the blood—also in many forms of pneumonia. Butter-milk is useful in typhoid and in gastro-intestinal disorders of children.

In post-partem hæmorrhage ½ to 1 litre of milk by rectal injection is good as a hæmostatic.

Whey Powder.

This is virtually Desiccated Milk deprived of fat and Casein. It has approximately the composition: Soluble Lactalbumen 14·25, Milk Sugar 74·45, Fats 0·27, Mineral Matter, chiefly Phosphate 9·8, Moisture 1·2%. It is practically sterile. It is employed in conjunction with cows' milk for producing a milk with a reduced proportion of Casein, and also of higher Sp. Gr., with the result that the amount of fluid is proportionally lessened. Or it may be prepared with water and cream,—the cream being low in Casein, sugar and ash, but high in fat, whilst the whey is low in fat, but high in ash, sugar and lactalbumen. It may also be used alone to produce Milk Whey by dissolving in water.

Human Milk contains on an average 0·8% Casein and 0·6% Lactalbumen; **Cows' Milk** 2·7% to 3% Casein and 0·2 to 0·3% Lactalbumen. *Cf.* also p. 585 for other constituents and *Vol. II.* In diluting Cows' Milk with water to reduce the Casein content it is obvious that the deficiency in Lactalbumen is rendered still more in error.

It is also clear, if the above figures be correct, that a breast-fed child taking 1,000 Gm. of milk in a day, will receive 6 Gm. of Lactalbumen. *A child receiving, say,* 600 *Gm. of Cows' Milk would receive only* 1·8 *Gm., at most, of the same albumen. This lactalbumen is soluble, i.e., it does not undergo precipitation with acid and digestion with pepsin and pancreatin before assimilation.*

Arguing by analogy with the high albumen content in Colostrum which the newly born calf receives (*cf. Vol. II.*) the advocates of Lactalbumen, as an addition to cows' milk for infants' milk, claim that it is important to supply the infant with a form of protein which makes small demand on the digestive glands, and which does not require much transformation before it can be absorbed.

Koumiss (Artificial). *Syn.* ✱**KEPHIR (T.M. 298465, Class 42).**

Dissolve Grape Sugar ½ ounce in water 4 ounces, and add 20 grains of yeast and cow's milk 4 ounces. Place in a quart bottle and fill up with milk, cork and wire. Keep it cool and shake it frequently during four days. Koumiss thus prepared contains some alcohol (1 to 2%) and lactic acid (about 1 to 2%). The original Koumiss of the Tartars was made from mare's milk by using the peculiar Kephir ferment, which swells up on soaking in milk. This consisted in reality of yeast cells with certain bacteria (*B. Caucasicus*, Kern) In some respects it resembles mother's milk more than cow's milk.

Uses.—A food used in the Caucasus as a stimulant in exhaustion and in convalescence of phthisis. Was recommended by Metchnikoff as a nutritive and as an intestinal antiseptic. *See also Acidi Lactici Bacilli, Vol. II.*

Goat's Milk.—This appears to lie between human and cow's milk. It is recorded that a baby of seven weeks received 3 ozs. a day, the amount being increased as the natural supply failed, until at three months it was taking six feeds a day of 4 to 5 ounces each and nothing else—the milk was given straight as it came from the goat. Digestion was perfect and there was a gain in weight increasing from three to four ounces to from 6 to 8 ounces each week. A first class food requiring no preparation. The fat is both in large proportion and in finer globules. Not only do goats not suffer from tuberculosis, but their milk has a wonderful effect on children, especially on such as have to be brought up artificially and with whom cow's milk disagrees.—Brit. Goat Society.

Goat's Serum in cancer, see Cancer, Therapeutic Index.

Casein Preparations.

Casein is the principal albuminoid constituent of milk and is present in solution in the aqueous portion of the milk as an alkali-albuminate, probably as a calcium compound (the alkali in milk is about 0·5%). Some hold that Casein exists as Caseinogen, and that this is converted into Casein by ferment. It is precipitated by dilute acids (*e.g.*, acetic acid, which is utilised in method of estimation, *v. Vol. II.*). Casein is, furthermore, thrown out of solution by the action of the **rennet ferment.** Casein is present in milk to the extent of 3 to 5% (usually about 3½%). Once thrown out of solution it is not readily dissolved again except with added alkali or hydrochloric acid. **Cheese** is casein with a considerable proportion of fat.

Flocculent Casein, *see* Casumen, *infra* (specially prepared) is however, soluble in water.

✱**Plasmon** (Trade Marks numerous in Class 42), a soluble milk albumin (Casein). Nutritive and easily digested. Plasmon Biscuits, Arrowroot, Cocoa, and Chocolate are prepared.

Contains Phosphorus in organic combination to extent of 1·46%. Total

Phosphoric Acid found was 2·88%. Milk protein differs from other proteins in containing Phosphorus in combination.

For gastric ulcer, this and similar foods are much employed.

✱ **Casumen** (T.M. 239,245). A soluble form of Casein (Flocculent Casein) containing a very high percentage of protein (90%). For use in all cases where there is poor nutrition. It contains practically no fat or sugar. It may be mixed with cocoa, chocolate, bread (10%) for diabetics, &c.

Soluble and other Caseins, Modes of Making.—P.J. ii./12,155.

Pigmentum Casein (was in **St. M.'s H.**). *Syn.* **Unguentum Caseinæ.** Casein 14, Potassium Carbonate ½, Glycerin 7, Vaselin 21, Zinc Oxide ½, Phenol ½, Water to 100. If good Casein be used we find this is almost too thick—add a little more water. A basis for skin medicaments. Thymol *q.s.* may be added to preserve it.

Proprietary Foods in Infant Feeding.

Many proprietary Infants' Foods are *deficient in fat.* This may provide partial explanation of the characteristic liability to infection so frequently seen in fat but pasty babies reared on this type of Food—J. C. Drummond, L. ii./18,482. *cf.* Vitamins.

Proprietary Infants' Foods are thus classified :—

1. Foods with a basis of dried cow's milk but mixed with flour.

2. Foods consisting mainly of flours, the starch of which is practically unaltered or altered only by heating.

5. Foods consisting mainly of flours mixed with a proportion of malt flour of malt extract, but containing much unaltered starch which is not converted into soluble products during the process of preparing the food for infants in accordance with the directions given on the package.

4. Foods containing flours, but also containing active diastase or pancreatic ferment, so that if the food is carefully prepared according to the directions on the package the starch is appreciably altered.

5. Foods manufactured from flours, the starch of which has been mainly or partially converted into soluble products during the course of manufacture.

The observation is made that most proprietary foods are deficient in fat and also in fat-soluble factor, whilst a number are also stated to be inadequate with respect to the water-soluble factor, and all are deficient in the anti-scorbutic factor.—From Med. Res. Com. Report, per C.D. Feb. 14, '20. *See also* Roy. Soc. Med. Discussion, L. i./20,604.

Excess of sugar in proprietary foods is a common cause of infantile dyspepsia, especially amongst the poor. These foods (7 classes are described) have, however, a field of utility. Condensed milk with excessive sugar is liable to produce fermentative dyspepsia. For children over six months the low fat content is very liable to produce rickets.—B.M.J. i./13,872.

Proprietary Foods and Milks. A good summary, including Allenbury's Food, Mellin's, Horlick's and a number of nitrogenous foods.—E. Cautley, Pr. July, 1922. Investigations of 106 foods a few years ago—see H. C. Cameron, B.M.J. ii./25,287.

✱ **Glaxo** (T.M. 364394 and 433121).

This infants' food is a dried milk containing added Lactose. In addition to the standard Full Cream Glaxo there are issued, No. 1 or half cream and No. 2 or three quarters cream. The Full Cream contains approx. 25·5% Fat and 42·5% Lactose, the 'No. 1' 15·8% Fat, 49·2% Carbohydrates, the No. 2 20% Fat and 45% Carbohydrates. The Carbohydrates in Nos. 1 and 2 consist of lactose with nearly 10% Cane Sugar.

Savory & Moore's Food is stated to contain the active enzymes and vitamines of malt. It contains no dried milk. In preparing it for use it is not heated sufficiently to impair vitamins or enzymes. When so prepared it approximates mothers' milk.

✱ **Vitafer** (T.M. 324675, 333647, 347470).—A tonic food.

Dose.—Two teaspoonsful three or four times daily mixed with milk porridge, cocoa or any fluid food. For children under 10 three teaspoonsful daily; infants proportionately.

The "Lancet" found Protein not exclusively Casein as some is present as Milk Albumin. Moisture 6·3%, Mineral Matter 10·7%, total Protein 80·4%, Fat 2·6% Total Phosphoric Acid as Glycerophosphates 3·84%.

✱**Almata** (T.M. 424829).

Described as a complete food. It has a butter value approaching that of human milk. The amount of Almata which can be rendered digestible (brought to the optimum hydrogen-ion-concentration for gastric digestion in the infant) by the same amount of Hydrochloric acid of the gastric juice is almost equal to that of human milk and considerably more than cows' milk.—L.i./'24,793.

Rats fed on it solely for 3 generations, and the third still showed normal growth. It contains adequate supply of all the Vitamins and also all the needed mineral constituents. It is made from egg-yolk, butter, malto-dextrins, and decitrated fresh fruit juice. Reports show that in practice the food has many advantages.—B.M.J., ii./25,910.

It is specially claimed that the percentage of fat absorption by infants fed on Almata is as high as that of breast milk fat and that percentage calcium absorption is relatively high. It is also of value as a galactagogue and an invalid food.—B.M.J. ii./27,780.

Other Food Preparations.

✱**Benger's Food** (T.M. 321,220). A wheaten flour preparation containing the natural starch with Trypsin and Amylopsin. It is used with fresh milk or milk and water in proportion required, artificial digestion being stopped at any point by boiling. The Trypsin acts on the milk used. After 15 minutes self digestion the percentage of unconverted starch is 1·5. After 30 minutes 0·5. The digestion can be conducted for from 5 to 45 minutes as desired. It gives the body nourishment with complete or partial rest to the digestive system. The point of the preparation is that if the digestive system, however weak, can do any work at all, it should be given it to do to the extent of its power. The fat may be increased by adding cream or upper-milk.

✱**Glax-Ovo** (T.M. 450299).

Described as a tonic food beverage. A palatable, readily-prepared, easily-digestible food. It contains Ostelin.

Gluten.—*Syn.* VEGETABLE ALBUMEN. A protein mixture obtainable from wheat flour as an elastic mass when moist.

Preparation.—Knead flour with about half its weight of water to produce a stiff dough. Knead further in running water till free from starch. Wheat Protein is digested in less time than the majority of animal proteins.

Importance of Carbohydrates in present day economy. Plants can be stimulated by Carbon Dioxide. The sugar beet is a biennial. Wood is being depleted for paper-making.—P. Haas, P.J. i./22,222.

NEM. (NAEHRUNG'S EINHEIT MILCH). A unit used by Von Pirquet. The energy contained in 1 Cc. of milk. It is based primarily on calorimetry, aided by calculations which deduce the energy requirements of an individual from his body weight and his sitting (not his standing) height. A dietary is based upon it.—Prof. Gowland Hopkins, L. i./21,3.

DIABETIC FOODS.

Starchless Bread (both brown and white) also Biscuits and Flour are manufactured. These are generally **Gluten Products** (more or less free from Starch) and Bran foods. Previously they were the only foods available for diabetics. **Casein** (with eggs and butter) has latterly been employed. Casein bread and biscuits (Callard & Co., London) are free from Carbohydrates and are palatable.

It is best to give this casein bread with a weighed quantity of starchy bread when desired. 'Gluten Bread' may contain as much as 55% of starch. It *can* be made with 7% of starch, but it is not palatable.

Home made Diabetic Bread from milk Casein of separated milk, with addition of egg white, Salt, Cream of Tartar, etc., as used at Duff House.—E. Spriggs, B.M.J. ii./21,707, L. ii./21,960.

The **Iodine Test** is useful for the detection of Starch in so-called Starch Free Foods and should be applied in cases of doubt. A deep *violet* indicates *unaltered starch* : partially altered starch will give a brownish colour. We were informed that many Continental Diabetic Foods offered for their palatability actually contain a *higher proportion of Starch than ordinary white bread.* Almonds and other nuts are also used for making bread and biscuits. Various **Sugarless Condiments**, foods and drinks are prepared. Saccharin is used as the sweetening agent.

The following lists may be useful in assisting the SELECTION OF FOODS FOR DIABETICS :—

(i) ***Foods free from Carbohydrates*** or containing less than 1%,—Beef, Mutton, Lamb, Pork, Poultry, Game, Sweetbread, Tongue, Fish, Turtle, Lobster, Eggs, Butter, Cheshire, American, Dutch and Gorgonzola Cheeses, Lard, Gelatin and 'honest' Starch and Sugar free special foods.

(ii) ***Foods containing a low proportion of Carbohydrates*** (percentage of Carbohydrate is indicated).—

Liver 1, Sausage (Pork) 1, Crab 1, Crayfish 1, Scallops 3, Asparagus 3, Celery 3, Cucumbers 3, Lettuce 3, Spinach 3, Oysters 4, Mussels 4, Stilton Cheese 3, Cheddar 4, Rhubarb 4, Tomatoes 4, Mixed Pickles 4, Cauliflower 5, Leeks 6, Radishes 6, Mushrooms 7. Water Melons 7.

(iii) ***Foods rich in Carbohydrate***—Milk 5 or more, Whey 5, Oatmeal (thin gruel) 6, Strawberries 7, Turnips 8, Carrots 9, Beet (fresh). Cranberries and Pineapple 10, Oatmeal (boiled), Blackberries, Dried Peaches 11, Oranges 12, Parsnips, Apricots, Currants, Walnuts and Filberts 13, Apples and Pears 14, Macaroni (cooked) 16, Calves Foot Jelly, Artichokes, Peas (Green), Cherries and Almonds 17, Potatoes and Pears (dried) 18. Figs and Grapes 19, Plums 20, Boiled Potatoes 21, Bananas 22, Rice (boiled) 24, Tapioca Pudding and Cocoa-nuts 28, Chocolate 30, Mince-pie 38, Chestnuts (fresh) 42, Apple Pie 43, Bread (Brown) 47, Potatoes (fried chips) 47, Bread (White) 53, Rolls 56, Lentils (dried) 60, Bread (toasted) 61, Peas (dried) 62, Gingerbread 63, Macaroons 65, Sponge Cake 66, Oatmeal 67, Chestnuts (dried) 74, Sago 78, Tapioca 88, Arrowroot 97, Dried Fruits, *i.e.*, Apples, Apricots, Currants, Dates, Figs, Prunes, Raisins 62–78. Meal Flour, Rice, Macaroni, Vermicelli 70–80.

In the case of list (ii.) much of the Carbohydrates in some of them is in the form of Cellulose, which is not absorbed.

The majority of the above figures are from the analyses of Atwater and Bryant.—L. ii./11,1184.

ACCESSORY FOOD FACTORS.

The chemical composition of these bodies, to which the name **Vitamin** was originally given by Funk, remains quite ill defined.

By eliminating them from the diet in animal experiments it can be shown that they are essential to growth and freedom from disease, for example, an animal fed merely on pure protein, fat, the carbohydrates and the inorganic salts of food, will die within a short time.

Three main types of these substances were originally defined, namely, the Vitamins A, B and C, but recently it has been shown that the fat soluble factor of Cod-Liver Oil can be separated into the *growth-promoting Vitamin A* and an *antirachitic factor, Vitamin D.* (*See* Med. Res. Council Report No. 38.) An additional fat-soluble factor, Vitamin E, has been proved by animal experiments to be necessary for satisfactory reproduction.

Examples of deficiency diseases are beri-beri, pellagra, scurvy and rickets. Obscure and apparently trivial complaints are probably also to be included.—Prof. Halliburton. For notes on treatment with substances rich in Vitamins see p. 594.

The chief sources and properties of the Vitamins, with the results of animal experiments, are summarised below, but for *more detailed information and abstracts from the literature Volume II.* should be consulted.

Vitamin 'A.' *Fat Soluble.* **The Growth-promoting Factor.**

Absence of the **'A' Factor** both by animal experiment and by observance of conditions amongst the poor, where such foods as milk, butter and eggs are not available, has been proved to be the fore-runner of malnutrition diseases.

The total absence of any of the factors in either Lard, Vegetable Oils Margarine and White Bread is a serious contemplation. Note, however, that the majority of animal fats—fish oils in particular—contain a fair proportion of 'A' factor. *cf.* E. Mellanby, L. i./19,407.

In animals the lack of this Vitamin produces xerophthalmia.

Occurrence. Cod-Liver Oil +++, Cream ++, Green Vegetables ++.

Bananas proved by rat experiments to contain Vitamin A, in addition to B and C. Suggested as excellent food for children.—B.M.J.E., ii./24,64.

For Methods of Colorimetric Estimation, see Vol. II.

Stability. This Vitamin resists temperatures of 100° and probably 140° C., but it may be destroyed by oxidation.

Vitamin 'A' can be obtained in a concentrated form by separation of the unsaponifiable portion of Cod-Liver Oil (*q.v.*).

Vitamin 'B.' *Water Soluble.* **The Anti-Neurotic Factor.**

This is removed in rice polishings and its absence has been proved to cause beri-beri. *See* Vol. II.

In ordinary human diet, out of 3 lb. of food, only about 6 oz. contain significant quantities of Vitamin B: ordinary daily diet seriously deficient in Vitamin B, but the consequent tendency to intestinal atonia somewhat counterbalanced by widespread use of purgatives.—B.M.J., i./26,239.

Vitamin B is important during lactation.—G. A. Hartwell, L. ii./24,956.

Occurrence. Seed Germs, Yeast and Nuts +++; Meat and Milk +.

Stability. Comparatively stable at 100° C. and not easily oxidised. Slowly destroyed at 120° C.

Vitamin 'C.' *Water Soluble.* **The Antiscorbutic Factor.** Lack of this Vitamin results in scurvy.

Occurrence.—Cabbage, Lemon and Orange Juice +++, Meat and Milk +.

The substances regarded as richest in this vitamin include raw fresh green cabbage leaves, swede juice, sprouted cowpeas, grape-fruit juice, lemon juice fresh and dried, naartje juice, orange juice fresh and dried, raw tomato, tomato juice (tinned). Grapes have very low anti-scorbutic value. South African tomatoes much less potent than those grown in England. Milk by no means rich in Vitamin C.—Spec. Rep. Med. Res. Council, L. i./24,364.

Stability.—Gradually destroyed above 50° C.

Vitamin C is very sensitive to oxidising agents. Addition of either acid or alkali to water in which vegetables are boiled appears to increase loss of antiscorbutic property.—Spec. Report, Med. Res. Council, L. i./24,364.

Vitamin (Antiscorbutic) Tablets, made by the late Sir P. W. Bassett-Smith's method (L. i./20,1102; ii./20,997; *see also* B.M.J., i./25,377,385), stored for over 12 months, were proved to have retained their efficacy, while fresh lemon juice imported from Messina, with and without Potassium Metabisulphite had no antiscorbutic power.

Vitamin 'D.' *Fat Soluble.* **The Antirachitic Factor.** The observation that rickets could be cured by ultra-violet light did not appear at first to agree with the theory that rickets was a Vitamin-deficiency disease. It has been shown recently, however, that not only irradiation of the skin, but also irradiation of the food has an antirachitic action. Based on these results preparations containing this factor have been manufactured, usually by treatment of cholesterol or a similar alcohol with ultra-violet light, as substitutes for Cod-Liver Oil, see p. 596 and Radiostol.

Occurrence.—Cod-Liver Oil + + +, Cream + +, Green Vegetables + +. Similar effects are obtained by the action of sunlight on the skin.

Antirachitic Vitamin D of Cod-Liver Oil.—S. G. Willimott and F. Wokes, P.J., ii./26,473,495.

Cholesterol or Phytosterol is a parent substance of the antirachitic Vitamin 'D.'—L. i./26,273.

Fat-Soluble Vitamin is found in association with the Cholesterol of fats, and is increased by Ultra-Violet rays.—Prof. Dixon, B.M.J., i./25,666. *See also* our p. 596.

Stability.—In oily media it is stable to heat and oxidation.

Vitamin 'E.' *Oil Soluble.*

The absence of this factor from the diet of animals has been shown to cause sterility, but comparatively little is known of this Vitamin and its relation to the human economy.

The necessity for a special Vitamin 'E.'—B. Sire, Jl. Biol. Chem. 62, p. 315.

Occurrence.—Wheat Germ Oil + + +, Lettuce and Peas + +. Also present in yellow maize and hemp seed and in the unsaponifiable matter of some vegetable oils. Absent from Cod-Liver Oil.

Stability.—Not destroyed at 238° and not by acid nor alkali.

Iron assimilation and Vitamin E.—P.J., ii./27,210.

Some recent References bearing on the Vitamin Theory in treatment.

Defective Dietary.—On broad lines, we cannot forego the opportunity to point out the poor nutritive value of many of the foodstuffs which are supplied to the poorer classes—this is also fully dealt with in Vol. II.

The dietary of the people of this country is defective in two important respects (1) It contains too little of the substances containing fat-soluble Vitamins; (2) It contains relatively too much cereal. This defective dietary causes destructive action on developing bones and teeth, as the fat-soluble Vitamins ***stimulate calcification, while excess of cereal interferes with calcification.*** The widespread development of caries in children's teeth is primarily a problem of defective feeding. It is possible that the defects of diet of women during pregnancy and lactation are responsible for some, and possibly much, of the illness and mortality of young infants.—E. Mellanby, B.M.J., i./26,515-519.

Causes of our C3 population.—Widespread diseases, such as dysentery, diarrhœa, and even tuberculosis may one day be relegated to the group of deficiency diseases. Tuberculosis is always associated with fat deficiency, and any improvement in the condition of the patient is always accompanied by increase in fat deposit in the tissues. A lack of knowledge of elementary facts with regard to cooking of food among the women of this country is deplorable. Margarine, now made from vegetable oils at high temperature, is the diet proved by experiment to produce rickets in rats.—T. E. Knowles Stansfield, B.M.J., ii./21,1021.

What clinicians are likely to meet with are the results not of acute complete Vitamin deficiency, which is rare, but of ***chronic Vitamin underfeeding.*** It is an established fact that the younger the animal the more rapidly does it succumb to Vitamin deficiency. *Vitamin underfeeding has become a big social problem, due to our allowing our basal articles of food to be deprived of their Vitamins. The problem can be remedied, as soon as its existence is generally recognised, by a demand for bread containing an ample supply of Vitamin B, for margarine with an ample supply of Vitamin A, and by realising the importance of whole milk, and the inadequacy of skimmed milk in infant feeding.*—W. Cramer, L. *i.*/24,633-640.

Diet and Accessory Food Factors in relation to prevention of diseases of the teeth.—J. S. Wallace, L. ii./27,218.

The average normal ration of milk fat required by a man is 40 to 50 Gm. and the average daily consumption is far less than this amount for a large part of the population.—W. Cramer, L. ii./27,777.

An adequate supply of all the known Vitamins can be obtained by ***germinating all the legumes or cereals,*** *e.g.*, by soaking in fresh water for 24 hours and then keeping moist for another 48 hours, when sprouts ¼ to ½ inch long will appear. If cooked in this condition for 10 to 15 minutes they are ready to eat. This foodstuff should be remembered in the absence of vegetables and fruits.

In addition to changes that occur in the eye (keratomalacia), Vitamin A deficiency has been found to give rise, experimentally, to a widespread tendency to keratinisation together with a marked loss of fat, despite abundance of fat in the diet. Connection between Vitamin deficiency and cancer ?—Jl. A.M A., ii./25,2035.

KERATOMALACIA, produced experimentally in children in Denmark (where, curiously enough, this disease is most prevalent), showed that in spite of a varied and apparently nutritious diet an almost complete deficiency in Vitamins was established by the substitution of margarine for butter, skimmed milk for whole milk, and the absence of cream or eggs from the diet. Cod-Liver Oil effected a cure.—W. Cramer, L. i./24,633.

Beri-Beri.—*See Vol. II.*

Rickets.—In the treatment of rickets the evidence seems to be that Cod-Liver Oil should be given in conjunction with *Calcium Salts* or that irradiation should be employed to produce the ultimate same effect as the Vitamin 'D.'

Value of various fats as foods from antirachitic point of view. Cod liver oil, beef suet, butter and egg yolk good.—E. Mellanby, B.M.J. i./22,790.

The subject of diet and sunlight is also dealt with by E. Mellanby, who suggests a typical diet for children with severe rickets to comprise, milk 1 to 1½ pints; beef dripping 1 to 2 oz. with bread; meat 1 to 2 oz. mixed with potatoes; 1 egg; milk pudding and 1 orange, combined with 1 to 4 drachms Cod Liver Oil thrice daily.—E. Mellanby, B.M.J. ii./22,852.

Cod Liver Oil, the cheapest form of vitamins.—Milk, green vegetables, and especially raw salads, are important. Diets, as a rule, are rich in phosphorus but deficient in calcium. A remedy might be to ***add about 2% Calcium Carbonate to butter.***—Prof. E. Mellanby, B.M.J. i./23,192.

Cereal foods a factor in rickets.—Prof. Mellanby's Report—stressing Calcium.—B.M.J., i./25,704.

The fact that Butter fat is a feeble antirachitic is of great importance in so far as the explanation of the occurrence of rickets in the human being is concerned.—Hess and Co-workers, L. ii./21,668.

Cod-Liver Oil superior to other substances which contain Fat Soluble Accessory Factor in the treatment of rickets. A sample of crude, unrefined *Cod-Liver Oil was found to be* 250 *times as potent as butter.* Refining of Cod-Liver Oil (*e.g.* with Ozone) is possibly excessive.—S. S. Zilva, L. i./21,323. *See also* B.M.J. i./22,236.

As a result of the Vienna Expedition ***Cod-Liver Oil has been conclusively proved to be a preventive and cure for rickets.*** A diet which in winter permits the development of rickets may be in summer with the help of sunlight, adequate to stave it off. The disease may be quickly cured by sunlight or the Mercury-vapour lamp. Evidence obtained that the administration of Cod-Liver Oil to the mother may greatly increase the value of her milk.—Leader, L. i./23,1169.

Final account of Vienna investigations.—M.T.C. Report.—B.M.J. i./23,987.

The milk from cows stall-fed and kept in the dark may be of poor quality. The antirachitic Vitamin needs sunlight.—Sir W. Fletcher, L. ii./26,741.

Sunlight a more important factor than diet.—B.M.J., ii./26,606.

The antirachitic body in Cod-Liver Oil and radiant energy in the form of ***Ultra-Violet light,*** both apparently act in the same way—this mode of action is a facilitation of ***absorption of Calcium and Phosphorus from the intestine into the blood stream.***—A. Webster and L. Hill, B.M.J., i./25,957.

Deficiencies in Calcium, Phosphorus, Iron, Iodine can be remedied in animal feeding.—Minerals more important than Vitamins.—Sir R. Grieg, L. ii./26, 1069.

In **Iodine** possibly is the source of a number of ***efficient Vitamin substitutes*** offering striking parallels with the genuine article. Vitamins A and D, both of which appear to be connected with rickets, act by promoting absorption. Iodine acts similarly. ***Lack of Iodide*** means diminished size in animal experiments.—Chilean Review.

THE PRODUCTION OF THE ANTIRACHITIC FACTOR BY IRRADIATION.

Vegetable oils, dried milk, condensed milk, and wheat flour, exposed to radiations from a Mercury arc lamp, even for 2 minutes at a distance of one foot, acquire marked antirachitic properties, and may be administered in lieu of Cod-Liver Oil. These acquired properties are maintained over long periods. Cream, hæmoglobin, 'egg phosphatides,' Glycerin and Gelatin, do not acquire these properties. A cheap method for providing Vitamin-containing foods: protected by Provisional Patent.—R. C. Owens, Pres., June '26,234.

Two minutes' irradiation activates linseed oil. Irradiated olive oil can be kept 10 months: Linseed oil 6 months and still possess antirachitic power. Severe active rickets showed bone lesions healed after two months' treatment with *irradiated sweetened condensed milk.* Dried milk cases showed healing also in 1 to 2 months. —H. M. M. Mackay and H. F. Shaw, L. i./26,8.

Irradiation of milk and the healing of rickets. The milk was exposed to the rays of a Mercury Vapour lamp of the Hanot type twice a day, in a wide shallow dish. There was a remarkable 'activating' effect, and dense calcification of wrist bone occurred. —S. J. Cowell, B.M.J. i./25,594.

Sixteen out of 18 cases of rickets recovered within four to six weeks when fed with milk previously irradiated for 30 to 60 minutes.—per Jl. A.M.A. ii./25,397.

Improvement of general condition and of focal lesions in children with active bone tuberculosis when given irradiated milk. Increase of red cells.—V. Dawkins and C. L. Pattison, L. ii./26,1315.

Goats' Milk increased in activity even more than cows' milk.—P.J., ii./27,254.

Phytosterol $C_{26}H_{44}O + H_2O$ an alcohol contained in maize, peas, beans and the majority of vegetable oils, and **Cholesterol** obtained from oils although unable to protect against rickets can be endowed with antirachitic power by ultra-violet irradiation. A. F. Hess and M. Weinstock, L. i./26,12.

Radiostol is prepared similarly from Ergosterol (see below).

Irradiated Cholesterol found to prevent rickets when given subcutaneously. —Jl. Biol. Chem., per Jl. A.M.A., ii./25,224.

Irradiated Orange Juice resuscitated rachitic rats.—B.M.J.E., ii./26,26.

Scurvy.—To prevent infantile scurvy an adequate amount of Vitamin C must be present in diet. Cows' milk may be deficient in this in winter.—P. Eggleton and L. J. Harris, B.M.J. ii./25,989.

Vitamin theory of scurvy challenged.—R. Hutchinson, B.M.J. i./25,603.

Germinating Beans and Lemon Juice in treatment of scurvy in Serbian Army. Similar amounts of each given to patients in different wards. 70·4% of patients treated with Beans cured in 4 weeks, as against 52·4% of those treated with Lemon Juice. Importance of starting antiscorbutic remedies early and avoiding destruction of Vitamin C by overcooking food.—H. W. Wiltshire, Jl. Trop. Med., Feb. 1/23,48.

SPRUE.—For the use of **Strawberry Extractive**, see *Fragaria.*

TUBERCULOSIS.—As a result of animal experiments, the late Sir P. Bassett-Smith concludes that it is good practice to reinforce the diet of early cases and to recommend Cod-Liver Oil, Marmite and fresh fruit in all cases. In slight affections, the addition of these Vitamins in man are possibly protective.—Trans. Roy. Soc. Trop. Med., Vol. 17, No. 4, p. 235.

Vitamins in relation to their Medical Supplies. A useful resumé. —F. H. Carr, P.J. ii./26,729.

The isolation of the Vitamins.—R. C. Owens, Pres., June '26,235.

Vitamin preparations of Commerce.

Irradiated Ergosterol. *Syn.* ✱**Radiostol** (T.M. 477,932).

Irradiation of Ergosterol with the Mercury Vapour Lamp produces the most powerful antirachitic substance known.

Vitamin D is necessary to ensure Calcium and Phosphorus absorption.

Feeding experiments showed that irradiated Ergosterol will protect rats from rickets in doses of less than 0·0001 mgr.—B.M.J. ii./27,888, *ibid.* 1005.

Ergosterol can also be activated by sunlight.—O. Rosenheim and T. A. Webster, L. ii./27,622.

In clinical practice, irradiated Ergosterol in doses of 2 to 5 mgr., administered either in Olive Oil or in tablet form, had curative effects in cases of rickets, late rickets and osteomalacia. In one case of osteomalacia a striking cure was obtained with daily doses of 10 mgr.—L. ii./27,766 : see also *ibid.* 623.

✱**Radiostol Solution** contains irradiated Ergosterol **mixed** with oil and adjusted to have approximately 50 times the activity of Cod Liver Oil. *Dose.* —Two drops or more on sugar.

✱**Radiostol Pellets** contain this Vitamin product together with Calcium Glycerophosphate. *Dose.*—One twice or thrice daily.

✱**Radiostoleum** (T.M. 478839) is a solution of a Vitamin A Concentrate and Radiostol in a vegetable oil. Stated to have 20 times the Vitamin content of Cod Liver Oil.

✱**Radiomulsin** (T.M. 478839) is an Emulsion containing Radiostoleum.

✱**Radiomalt**, see p. 549.

'**University Cream,**' *Syn.* EMULSIO SEVI, U.C.H. Beef suet 40 ozs., Arachis Oil 5 ozs., Syrup 25 ounces, Benzoic Acid 40 grains, Decoction of Irish Moss 70 ozs., water to 1 gallon. Melt the suet, add the oil and the Benzoic Acid. Heat the Moss Decoction to about 60° C., place in an emulsifier and add the fats at about the same temperature. Finally add the syrup and water. This keeps well and mixes well with milk.—C. H. Hampshire and G. E. G. Hawker., B.P.Conf., 1919.

For use instead of cow's cream in preparing infants' feeds.

It supersedes '**Marylebone Cream.**'—Eric Pritchard, L.i./20,607.

Butol Emulsion V.H.C.

An emulsion of fats and oils (Beef Dripping, Cod Liver Oil, Arachis Oil and Butter) with Glucose and 5% Cane Sugar—with or without Dextrin, using Irish Moss to suspend. For feeding of children.

'New Zealand Cream.'—Fat is known to be the most difficult and important constituent of infants' diet, and nearly all prepared infant foods are deficient in this constituent. Natural cream possesses the disadvantage of uncertain composition and emulsified fats are more satisfactory in use, a 50% emulsion containing Cod-Liver Oil being recommended. 'New Zealand Cream' as manufactured in New Zealand's Government Factory and intended for use throughout that country—containing 50% fat, of which 2/3 is animal oil, including fresh New Zealand butter and Cod-Liver Oil, and 1/3 vegetable oils, mainly pea-nut; sugars, mainly Dextrose and a little Lactose, made up 40%. Satisfactory in use, readily assimilable, sterile, containing Vitamins intact, and high caloric value of 180 per ounce.—R. Jewesbury, B.M.J. i./26,245.

✱ **Vitmar** (T.M. 389337 and 452,194 Cl. 42). *Dose.*—An eggspoonful after meals every day. Described as a food containing the Fat Soluble (A) growth promoting, Water Soluble (B) antineurotic and Water Soluble (C) antiscorbutic Vitamins, suitable for backward and delicate children. The fat soluble portion is emulsified. It is stated to have a food value of 400 calories per 100 Gm.

✱ **Vitamogen** (T.M. 363554). A food stated to be a means of supplying Vitamines readily taken which does not upset digestion for children and adults. In nervous affections, dyspepsia and malnutrition.

Mineral Matter 7·5%, Protein content 24·96%, Sugar 20·83%, Starch 26·25%, Fat 1·51%, Cellulose or Fibre 11·95%, gives a marked response for active enzymes.—L. i./17,381.

Metagen is stated to contain the three principal Vitamins, physiologically tested.

A useful DIET SCALE. Equivalents of foods, (Carbohydrates, proteins and fats). An ounce of Carbohydrates or protein yields 120 calories, and an ounce of fat yields 270 calories.—H. S. Pemberton, B.M.J. i./23,680.

P1 NUX VOMICA (*B.P.* '14).

P1 *and all preparations or admixtures containing* 0·2% *or more of Strychnine.*

Antidotes. *See* **Strychnine.**

Dose.—1 to 4 grains (**0·06 to 0·25 Gm.**) in powder. FR. CX. (*vide infra*) approximates latter as a maximum dose during 24 hours.

The dried ripe seeds of *Strychnos Nux-vomica* (*Loganiaceæ*), imported from India and Ceylon, contain from 0·7 to 1·5% of Strychnine. *B.P.* '14 requires the drug in powder adjusted to 1·25% Strychnine.

F.I. (Second) recommended a standard of 2·5% total alkaloids. This is in accord with nearly all the pharmacopœias. The British delegates pointed out that a standard based on Strychnine content is best.—E. White, P.J. i./26,294.

A minute quantity of copper is said to be present in the seeds, and this may colour mixtures made with Tinctures of Nux Vomica and Sal Volatile a bluish green shade. FR. CX. requires not less than 2, nor more than 3% (combined) alkaloids.

For further details on Assay of Nux Vomica see Vol. II.

Flavoring for Nux Vomica preparations, see Strychnine.

Uses.—A bitter stomachic and tonic. Stimulates the bowels, hence added to aperients. Increases nervous energy. Given to relieve shock and collapse from anæsthetics. Is employed in dyspepsia, heart weakness, and as a general tonic in all conditions of debility and neurasthenia. For the aged, this and Strychnine have been described as the only suitable bitter tonics.

In phosphaturia, small doses of Nux Vomica and of Diluted Hydrochloric Acid are often of great service.—Tirard, Med. Treatment.

P1 Extractum Nucis Vomicæ ('Siccum') (*B.P.* '14).

Dose.—¼ to 1 grain (**0·016 to 0·06 Gm.**).

Contains 5% of Strychnine, adjusted with Calcium Phosphate.

This Extract absorbs moisture: Quantitative data.—F. Wokes, P.J., ii./26,188.

Fr. Cx. conforms with F.I. (Second) making the preparation 16% total alkaloids, with *max. single dose* ⅝ grain and max. in 24 hours 1½ grains approx. U.S. X. practically agrees with F.I. (Second). Nux Vomica Extract elsewhere abroad is called **Extractum Strychni.** P.G. VI. also agrees with F.I. (Second).

P1 Extractum Nucis Vomicæ Liquidum (*B.P.* '14).

Dose.—1 to 3 minims (**0·06 to 0·2 Cc.**).

Prepared by re-percolating the seeds in powder with Alcohol 70% (60% is adequate and it leaves the fat behind), defatting with Hard Paraffin, and adjusting the strength so that the extract contains 1·5% of Strychnine.

Ⓟ Tinctura Nucis Vomicæ (*B.P.* '14).

Dose.—5 to 15 minims (**0·3 to 1 Cc.**), often less.

This contains 0·125% of strychnine, and is made on the lines of B.P. '98. One ounce contains about ½ grain of strychnine, or about half the quantity in the Tincture of B.P. '98, and the same strength as B.P. '85. It now = approx. F.I.

F.I. (Second) recommended 0·25% **total Alkaloids.**

Fr. Cx. prepares by dissolving 1·562 Gm. Extract (Fr. Cx.) in Alcohol 70% *q.s.* to produce 100 Gm. This contains 0·25% combined alkaloids (F.I.) Max. single *dose*, 19 minims. Max. during 24 hours 95 minims approximately, U.S. X. is a 1 in 10 Tincture adjusted to 0·25% Alkaloids (Total).

P1 Tablets equal 5 and 10 minims of the tincture.

Varicose veins have been treated with an application containing Nux Vomica. The legs to be rubbed very lightly from top to bottom, night and morning, with a piece of flannel soaked in an application composed of Nux Vomica Tincture 5, Hamamelis Tincture 4, Eau de Cologne to 100.

Each morning the patient to take a bath of 20 minutes' duration in water at 35° C. (95° F.) in which 500 Gm. (17½ ounces avoir.) sodium bicarbonate has been dissolved. The bath to be followed by a rest of half an hour.—Pres

Ⓟ Tinctura Ignatiæ.

Dose.—3 to 20 minims (**0·2 to 1·2 Cc.**).

From St. Ignatius' Beans, the seeds of *Strychnos Ignatii* (*Loganiaceæ*) (containing about 1½% Strychnine and 1% Brucine) 1 part, and a mixture of 90% Alcohol 3 and Water 1, *q.s.* to produce 10 parts. A preparation known as **P1 Gouttes Amères de Baumé** (Fr. Cx.), is of strength 1 in 5. *Max. single dose* 4 minims. Max. during 24 hours 30 minims approximately.

The Beans termed **Fève de Saint-Ignace** in Fr. Cx. from which this Tincture with the above Synonym is prepared, contain about

2·5% combined alkaloids. *Max. single dose* of the powdered Beans 1½ grains, *Max.* during 24 hours 5 grains approx.

P1 **Cabalonga de Tabasco, Ph. Mex. V.**—Mata-perros, veneno del diablo. *Strychnos triplinervia*, Mart. According to Professor Graham, the seeds contain 1.83 per cent. of strychnine and brucine. Used in place of St. Ignatius' Beans.

OLEA ESSENTIALIA.

The various essential oils used in medicine, prepared either by distillation or expression or a combination of the two, are dealt with under their respective headings.

For processes of Assay of Essential oils see Vol. II.

Constitution of Essentials. A useful summary, including a table of the B.P. '14 Oils classified as to constituents.—J. E. Driver, and G. E. Trease, P.J. ii./27,164.

Antiseptic Powers of certain Essential Oils.

The Carbolic Coefficients obtained by us under certain conditions (*vide Vol. II.*), for Essential Oils, show that several possess considerable antiseptic power. For example, Origanum Oil (containing over 80% Phenols, *e.g.*, Carvacrol), had almost the same coefficient as Thymol—an acknowledged excellent antiseptic, viz., 25 to 26. Following these came Oil of Thyme containing less Phenols, then Geraniol, Cinnamon Oils, Clove Oil, and so on in this order.

As an outcome of our investigations Saponaceous Solutions of some of the Essential Oils are prepared for physicians' use under the name—

Perfumed Formosyls of Almond, Cassia, Cinnamon, Citronella, Eucalyptus (Amygdalina), Eucalyptus (Globulus), Geranium, Lavender, Lemon, Origanum, Otto of Roses, Rosemary, Thyme and Wintergreen.

Uses.—For disinfection of the hands and skin. A tablespoonful to be poured in the palm of the hand and well rubbed and lathered with an equal quantity of water for two minutes. For treatment of skin affections local use as paints or lotions is suggested. (Individual preference as to aroma may be taken into account).

The strength of these Perfumed Formosyls is so arranged that when using any of them as directed above the suggested quantity contains sufficient Essential Oil to act as an efficient bactericide—indeed, an excess is present—in the light of knowledge which we have obtained comparatively with Carbolic Acid.

Terpeneless and Sesquiterpeneless Essential Oils are described in *Vol. II.*

OLEATA.

Acidum Oleicum. U.S. P. Jap.

$CH_3(CH_2)_7CH : CH(CH_2)_7COOH = 282{\cdot}272.$

A pale-sherry coloured faintly acid oily liquid (at ordinary temperatures) with a slight odour. *Solubility*, readily in 90% alcohol, ether, chloroform, benzol, and fixed oils; insoluble in water; it dissolves most metallic oxides, thus forming indefinite oleic solutions of oleates in an excess of Oleic Acid; such combinations of bismuth, opper, lead, mercury, and zinc are used medicinally; they are soluble n fats. Mercuric Oleate made this way is better than the B.P. '98. leic Acid also dissolves alkaloids, but not their salts, *e.g.*, Oleate of conitine, Oleate of Atropine (2½% perfumed with Otto), Oleate of orphine and Oleate of Veratrine are used medicinally. Oleic Acid s much more readily absorbed by the skin than oils. It also aids the bsorption of drugs with which it is combined.

The splitting up of Oleic Acid into Pelargonic and Azelaic Acid shows position of the double link.

$$C_8H_{17}CH:CH.C_7H_{14}.COOH+2O_2=\underset{\text{Pelargonic Acid.}}{C_8H_{17}COOH}+\underset{\text{Azelaic Acid.}}{COOH.C_7H_{14}COOH.}$$

Conversion of Unsaturated Fatty Acids into Saturated, *e.g.*, Oleic nto Stearic Acid—$C_{18}H_{34}O_2+H_2=C_{18}H_{36}O_2$. This achievement—a matter f great importance in the Oil industry—has been effected by bringing the ydrogen and the **liquid** fat together at high temperatures in the presence f finely divided Nickel (or Cobalt, Platinum, etc.) as catalytic agent. The roducts are used both for food and for soap making.—P.J. i./13,97.

Pharmacology.—Subcutaneous injections of Oleic Acid Soaps cause næmia.—A. E. Boycott, B.M.J. ii./10,1420.

Sodium Oleate, *inter alia*, increases the action of **lipase** *in vivo* and *in vitro*. —J. A. Shaw Mackenzie. See further under Sodii Oleas.

To prepare pure Metallic Oleates—Caspari recommends the preparation f (*a*) Sodium Oleate and (*b*) Potassium Oleate Solutions in place of ordinary oap solutions. (*a*) Warm 1,217 grains Oleic Acid to 60° C. and add slowly 92 grains Sodium Hydroxide (90%) dissolved in a mixture of 2 ounces Distilled Water and 6 drachms of Alcohol, stirring constantly until acid neutraised (use Phenolphthalein Solution). Dissolve finally in 3 pints of water and ilter. (*b*) Neutralise 410 grains Potassium Bicarbonate with 1,156 grains Oleic cid in 1 pint of water by boiling. When cold make up to 3 pints. To the olution (*a*) add Lead Acetate crystallised 819 grains, Copper Sulphate 540 rains, Zinc Sulphate 621 grains, Mercuric Nitrate 711 grains, or to (*b*) Lead cetate crystallised 777 grains, Copper Sulphate 510 grains, Zinc Sulphate 591 rains, or Mercuric Nitrate 675 grains, each dissolved in 1½ pints of water to roduce the corresponding pure Oleates.

apsules of Oleic Acid, 7½ minims. *Dose.*—One or two daily.

These are given for hepatic colic, and to hinder the formation of all stones. Best taken in the morning on an empty stomach.

P1 **Oleanodyne.**

A special preparation combining the alkaloids aconitine, atropine, morphine (0·3%), and veratrine, with oleic acid. It is rapidly absorbed, and forms a strong anodyne liniment, which can be diluted with chloroform, alcohol, or oils. It is not so compatible with compound camphor or soap liniment.

Cupri Oleas, **Copper Oleate.**

$(C_{17}H_{33}COO)_2Cu=626·098$. (Theoretical formula for Pure Oleate.)

Add a hot solution of copper sulphate 3 in 8 of water to a hot solution of Castile Soap 8 in 32 and wash and dry the precipitate. When cold it is in solid dark-green masses. It is an oleo-palmitate of copper, containing copper equivalent to about 10% Cupric Oxide. Soluble in ether.

Unguentum Cupri Oleatis.

Copper Oleate 12, Yellow Soft Paraffin 88. Melt together. For some purposes it may be employed half strength.

Is specially useful in ringworm—lightly rubbed in night and morning,—for indolent ulcers, warts and corns, and has been used to remove freckles.

Bougies of Copper Oleate are prepared 4 inches long containing each 5 grains (0·3 Gm.) Copper Oleate with Theobroma basis.

Ovules of Copper Oleate, with Cacao Butter basis contain 5 grains.

Ⓟ **Emplastrum Cupri Oleatis** contains 20% of Copper Oleate made with Soap Plaster spread on Adhesive Plaster.

For the treatment of malignant disease. These are useful adjuvants to the Sodium Coumarate treatment, reaction to treatment being more readily obtained with their aid.—L. Drage.

Hydrargyri Oleas. **Mercuric Oleate** (*B.P.* '14). 20% Oxide.

The 1898 B.P. method was intended to produce normal Oleate, but it did not work well. That of B.P. 1885 by acting on Mercuric Oxide with Oleic Acid is now re-adopted, using slight warmth, (B.P. '85 was 10%).

Unguentum Hydrargyri Oleatis (*B.P.* 14).

Mercuric Oleate 1. Benzoated Lard 3.

'**Capsungs**' of this ointment are prepared containing ½ drachm in each for inunction.

🄳 🄿1 **Oleatum Hydrargyri (10%) cum Morphina.**

Morphine (base) 1, is dissolved in 60 of the above. Linimentum Hydrargyri Oleatis cum Morphina, R.O.H., is similar. For use where the plain Oleate causes pain.

Oleatum Hydrargyri Liquidum, 5%.

Is prepared with one half as much oxide as the 10% and when ordered with morphine, 1 part is added to 60 parts of the oleate *when dispensed.* The 10% is dispensed unless otherwise ordered. They should be applied with a brush without much friction.

Uses of Mercuric Oleate Preparations.—For syphilis in secondary and tertiary stages. The application does not salivate unless used in excessive quantity. In persistent inflammation, especially of glands, and joints (such as synovitis), and in non-ulcerated syphiloderma, these Oleates are more active and cleanly than mercurial ointment. They are very effective parasiticides for pediculi and ringworm.

In rheumatoid arthritis the joints thickened by fibrous adhesions and fibroid thickenings of the synovial and periarticular tissues are treated with Mercuric Oleate.

Oleatum Hydrargyri cum Sulphure.

Mercuric Oleate 5%, 4, Precipitated Sulphur 1, Ether 3.

For pediculi pubis.

Unguentum Hydrargyri Oleatis Compositum. — BROOKE'S OINTMENT.—Mercuric Oleate Ointment (5%), Compound Zinc Paste (Lassar's Paste) of each 41, Salicylic Acid 6, Ichthyol 12.

In (septic) œdema of the face has been applied covered with cotton wool in thick layer and pressed down by cotton elastic bandage.

Syphilitic Disease of the Nervous System. It is not advisable to give Potassium Iodide and Mercury together in full doses, except in a very urgent case. A drachm of the 10% oleate should be rubbed in near the affected part twice daily for three or four days, and then once daily for remainder of the week; near the scalp if in the brain, and down the back if in the spinal cord: treatment to be brief, to last eight weeks or so, and be renewed after two, four or six months.—Gowers.

Ⓟ **Emplastrum Hydrargyri Stearatis.**

Lead Plaster 6, melt and add **Mercuric Stearate** $[(C_{17}H_{35}COO)_2$ $Hg=767{\cdot}17]$ 2, made by direct combination of Mercuric Oxide 10, with Stearic Acid 26 or *q.s.*—Melt the acid and gradually stir in the oxide until all dissolved—a sand bath may be necessary. Is a substitute for mercurial plaster, and for joints requiring Mercurial treatment, but it is pharmaceutically inelegant.

$\boxed{P1}$ **Emplastrum Plumbi** (*B.P.* '14). *Syn.* DIACHYLON PLASTER. $\boxed{P1}$ *Lead in combination with Oleic Acid or other higher fatty acids, whether sold as Diachylon or under any other designation (except Machine-spread Plasters)—May 27/17. We have followed the letter of the law by placing* **'Preparations of'** *in* Ⓟ. *Obviously in doubtful cases they should be treated as* $\boxed{P1}$.

Lead Plaster is a crude Oleate of Lead, made by the combination of olive oil (oleate and palmitate of glyceryl) and oxide of lead heated together in the presence of water. Thus made, the oleate is more adhesive than when prepared by the oleic acid solution of the oxide.

This has been used as an abortifacient in the Midland Counties.

Diachylon Pill poisoning (taken to produce abortion). *Treatment.* Sodium Monosulphite 1/3 grain with Tincture of Cardamoms thrice daily. Recovery. A powerful and dangerous ecbolic.—B.M.J. i./13,1199. Poisoning by: Treatment by potassium iodide, opium and bismuth —B.M.J. i./06,259.

Ⓟ **Emplastrum Resinæ, Adhesive Plaster** (*B.P.* 14).

Is more adhesive than Lead Plaster. Ⓟ **Emplastrum Saponis** is similar, but less adherent than the latter.

Ⓟ **Emplastrum Adhesivum, U.S., VIII.**

Melt Rubber 20, at not exceeding 150° C. (302° F.), add Petrolatum 20, and heat until rubber is dissolved. Add Lead Plaster 960, and then strain.

U.S.X. specifies a mixture of rubber, resins and waxes with a filler of absorbent powder, *e.g.*, zinc oxide, orris root or starch mechanically mixed. The mass should contain about 30% of rubber. When Zinc Oxide is used it should be at least 20% of the plaster mass. *Contains no lead.*

The following ointments are prescribed for eczema, excessive perspiration of the feet, &c.

Ⓟ **Unguentum Diachyli.**

Lead plaster 1, Yellow Soft Paraffin, 1.

Melt together and stir till cold. Made thus, the ointment keeps well, and does not acquire a disagreeable odour.

Ⓟ *Unguentum Diachyli Carbolisatum* (Lassar) is the same with 2% of phenol.

To be rubbed in 1 to 3 times a day, or spread on linen and applied as a plaster. **U.S.** has Lead Plaster 50, White Petrolatum 49, Lavender Oil 1.

Thorii Oleas *v.* Thorium Compounds.

Unguentum Zinci Oleatis (*B.P.* '14).

Precipitated Zinc Oleate 1, White Soft Paraffin, 1. Melt together and stir till cold. For some cases further dilution with Soft Paraffin is advisable. This ointment will cure chronic eczema.

Zinci Oleas—*Syn.* ZINC OLEO-STEARATE (*B.P.* '14).

$(C_{17}H_{33}COO)_2Zn=627{\cdot}908$. Theoretical formula for the Oleate.

Manufacture—To a solution of Hard Soap 2, and Curd Soap 1 in Water 15, add Zinc Sulphate 1 in Water 2.

This makes a *harder* preparation than the following:—Hard Soap in shavings 16, Boiling Water 120; heat to dissolve. Zinc Sulphate 8, Boiling Water 16; dissolve and add to former solution; stir well, separate the water from the Oleate, and wash the latter with hot water till free from sulphate, cool, and dry.

Reduced to powder is useful for dusting on eczematous surfaces and for excessive perspiration. It may be perfumed by the addition of $\frac{1}{500}$ of thymol, and diluted with kaolin or starch.

Ⓟ **Unguentum Oleatorum, G.H.**

Zinc Oleate Ointment, Diachylon Ointment and Mercury Oleate Ointment of each equal parts.

Zinci Stearas, U.S.X.

A white powder, yielding 13 to 15·5% of Zinc Oxide. Contains a small proportion of palmitate. Manufactured by precipitating a Curd Soap solution with Zinc Sulphate.

Poisoning due to accidental inhalation of Zinc Stearate produces interstitial pneumonia and peribronchitis, the lesions produced being more severe and lasting than those produced by other powders. Treatment is similar to broncho-pneumonia, Oxygen inhalations being warmly advocated. Manufacturers should dispense the powder only in a container with a suitable self-closing top.—Jl. A.M.A., ii./25,845.

Bismuthi Oleas. $Bi_2O.(C_{18}H_{33}O_2)_4 = 1559·056$.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**) but larger amounts would be used in X-ray work.

Manufacture.—Dissolve Bismuth Nitrate (cryst.) 960 grains in Glycerin, 40 ounces by weight in the cold. Add to the solution 3 pints of the Sodium Oleate solution (p. 601), wash by decanting, collect and dry. A greyish white unctuous substance.

Uses.—Should prove useful in place of Subnitrate or Carbonate in X-ray diagnosis: It would not be attacked so readily by the stomach juices. Might be tried instead of other Bismuth compounds, *e.g.* to form a coating on the stomach or intestines in gastric ulcer.

Stanni Oleas. $Sn(C_{18}H_{33}O_2)_4$ (?) $= 1243·756$.

Dose.—Not used internally.

Manufacture.—Add Stannic Chloride, 566 grains dissolved in the smallest quantity of water to 3 pints of the soap solution (*v.* p. 601)

Uses.—Has been employed in diseases of the nails—overcomes brittleness, splitting, etc.—Squire.

Uranii Oleas. $UO_2(C_{18}H_{33}O_2)_2 = 832·698$.

Dose (suggested).—½ to 5 grains (**0·03 to 0·3 Gm.**).

Manufacture.—Employ Uranium Nitrate 1092 grains with 3 pints of the Sodium Oleate solution p. 601.

A yellow substance of plastic consistence.

Uses.—Possesses radio-active properties. Suitable for local use to malignant growths and in skin affections as **Unguentum Uranii Oleatis.**—25% strength in Unguentum Lanolini softened if necessary *cf.* **Unguentum Thorii Oleatis.**

Silver Oleate, Iron Oleate (*Dose.*—5 to 15 grains) and the Oleates of **Strontium, Barium, Calcium** and **Magnesium** have also been prepared. For details of manufacture and properties see Edition xviii. pp. 605 and 606.

OLEUM CHAULMOOGRÆ, incorrectly termed Oleum Gynocardiæ (*B.P.* '14 **Synonym**); U.S.X., P. Argent. II., Ph. Ned. V.

Dose.—5 to 10 minims (**0·3 to 0·6 Cc.**), increased to 1 drachm (**4 Cc.**) in capsules, cod-liver oil, or milk.

The oil (about 33%) expressed from the seeds of *Taraktogenos Kurzii-King.* This is an evergreen shrub growing in Chittagong, Burma, and parts of Assam only.

The fruits yielding genuine Chaulmoogra Oil are distinguished from those of Gynocardia by containing *many* seeds (average 21) packed close together and facetted by mutual pressure, hence no two are the same identical shape, and having no pulp, the embryo is vertical and cordate, while that of Gynocardia is lateral and reniform.

The oil from *Taraktogenos Kurzii* is cold-drawn. It is a yellow oil with an odour of rancid butter and M. Pt. of 22—23° C. The residual cake is valuable for cattle feeding.

The Kalaw Tree frequently stated to be the historic origin of Chaulmoogra Oil is apparently the Burmese name for Taraktogenos Kurzii.—J. C. Ghosh, L. i./23,630.

Latterly the oil of various species of Hydnocarpus, *e.g.*, **Hydnocarpus Wightiana or Asteriastigma Macrocarpa**, growing in South and West India have been attracting attention (see p. 611) although relatively recently these were regarded as spurious substitutes. They differ in colour, odour, specific gravity and have M.pt. 26° C. approx.

Oleum Hydnocarpæ P.Jap. IV. is obtained from the peeled seeds of Hydnocarpus. At 22 to 23° C. the oil almost completely liquefies and at 25 to 30° C. it melts completely.

The name Chaulmoogra has been sometimes misapplied to a smaller seed derived from **Hydnocarpus anthelmintica**, a native of Siam, where it is known as Lukrabao. This is exported to China and used there for leprosy in place of the true Chaulmoogra, which may be regarded as the East Indian remedy. The oil of *Hydnocarpus Wightiana*, Blume, is used in Western India, and it has been found that all these oils, as well as that of *Onchoba echinata* Oliv., a native of Sierra Leone, contain Chaulmoogric Acid.

The use of the seeds of *Hydnocarpus anthelmintica*, Pierre, as an official source of Chaulmoogra Oil has been recommended, since they are cheaper, more easily obtained, and equally efficacious.—C. and D., i./25,769.

It is stated that the Taraktogenos Kurzii Oil is not the only active one. The whole matter will be settled by experience with various oils.—P.J., ii./26,110.

Gynocardia Odorata Oil has a brown colour and odour resembling painter's varnish and remains liquid at ordinary temperature down to 4·5° C. It is stated to have no therapeutic value in leprosy.—E. E. Francis, Chief Medical Officer, Assam Bengal Ry., Chittagong. It does not contain Chaulmoogric Acid but consists chiefly of the Glyceryl esters of Linolic and Linolinic Acids.

U.S.X. states the oil from certain sp. of Hydnocarpus—when designated as such and agreeing in physical and chemical characters with Chaulmoogra Oil *may replace.*

Uses.—The oil is applied externally, and given internally *after meals*, for leprosy, phthisis, scrofula, rheumatism, marasmus, psoriasis, and lupus. The treatment of leprosy with it has to be persisted in for several years. The theory of its action in leprosy seems to be that it increases the number of leucocytes and enhances the bactericidal properties of the blood. Leprosy has also been treated by half-ounce doses per rectum daily. Patients must refrain from salted food such as fish, cheese and vegetables.

For phthisis 2 to 4 ounces should be rubbed into the chest weekly. Applied to raw surfaces. however, causes great pain.

In the knowledge of the writers, a patient suffering from leprosy took over a long period, a large quantity of Chaulmoogra Oil Capsules. The dosage employed was two 15 minim Capsules four times daily, increased. He found that he could take up to 200 minims per diem, but larger quantities had a tendency to make him sick. The spots on the face and hands disappeared almost entirely, but there remained the deadened feeling of the tissues of which there was hope of complete disappearance.

Emulsio Olei Chaulmoogræ.

Dose.—½ to 1 drachm (2 to 4 Gm.).

We found the following formula satisfactory to produce a liquid Chaulmoogra preparation :—

Chaulmoogra Oil 1 ounce, Poppy Seed Oil 2 ounces, Powdered Gum Acacia ¾ ounce, Cinnamon Oil 6 minims, Saccharin Elixir 45 minims, with Water to make 6 ounces.

Injectio Olei Chaulmoogræ Intramuscularis.—*Martindale.*

Dose.—½ to 1 Cc., increased to tolerance.

Chaulmoogra Oil and Almond Oil equal parts, sterilised.

Sterules of this preparation containing 1 and 2 Cc. of the mixture are made. This preparation would be quite liquid in tropical climates. At room temperature in our laboratories in April it is solid but the warmth of the hand is sufficient to liquefy it. In very cold climates a 33% preparation would be better.

Injectio Olei Chaulmoogræ. Heiser's Injection.

Chaulmoogra Oil 60, Camphorated Oil 60, Resorcin 4. Heat on water bath to dissolve and filter. *Dose.*—1 Cc. increased to tolerance. In leprosy said to produce apparent cures or great improvement.

McCoy and Hollman, Public Health Bull, 75, January, 1916, Washington. (L. i./16,790) found the injection of oily preparations of Chaulmoogra badly tolerated—causing abscess, heart failure, etc.—in cases treated at the Hawaii Settlement. (Sodium Chaulmoograte 'C' on the other hand is tolerated).

Spontaneous remissions of leprosy. Spontaneous apparent cures occur A cure must stand the test of time—five years or more. In South Africa (Robben Island and elsewhere) for advanced nodular stages. Chaulmoogra Oil intramuscularly 3 to 5 Cc. at a time repeated every three days for five months or more, if patient can stand it, is considered the best palliative so far. The purified oil to be given internally in 15 minim capsules.—L ii./13,1529.

Heiser's method of injections sometimes give rise to disagreeable symptoms. Besides being painful, necrosis at the site of injection and oil-embolism of the lungs have occurred.—W. W. Cadbury per T.D.B., Vol. 17, 1921,279.

Recommended to dissolve Chaulmoogra Oil in equal parts Arachis Oil—injection not painful.—Klin. Woch., Apl. 30, '25,879, per Pres., Jan. '26,27.

Intravenous use of Chaulmoogra Oil. Preferable to Sodium Gynocardate, Sodium Hydnocardate or Sodium Morrhuate. Tartar Emetic useless. Moogrol intramuscularly too painful, but intravenously better borne than the crude oil—results doubtful. Tuberculin believed to be useless. Report on treatment of 265 cases at Makogal Asylum, Fiji.—Philip. Harper, Jl. Trop. Med., Jan. 1/23,7.

Given ***per rectum*** in cases where it was not tolerated by the mouth. The lower bowel should first be well washed out.—L. Stevenel, per T.D.B., Vol. 17/21,279, *ibid.* Vol. 14/408.

Leprosy at Makogai Asylum, Fiji, treated by a variety of methods. Chaulmoogra Oil certainly does ameliorate most cases and cure some.—P. Harper B.M.J. ii./22,39.

See also treatment with Hydnocarpus Oil preparations, p. 611, *and with a Vaccine, p.* 613, *Leprosy Bacillus, Vol. II.*, and *Leprosy, a self-healing disease, p.* 612.

Chaulmoogra Oil stated to contain bactericidal substances (the acids) about 100 times more active than Phenol.—Jl. Infec. Dis., Mar./20,238; B.M.J. ii./21,851; Pres. Feb./21,86.

The leucocytosis produced by Chaulmoogra Oil is a means of transport whereby the drug is brought into direct contact with the bacilli in the lymph circulation.—China Med. Jl., per Jl. A.M.A., ii./25,931.

Capsules of Chaulmoogra Oil contain 5, 10 and 20 grains.

Unguentum Chaulmoogræ (*B.P.* '14) *Syn.* UNGUENTUM GYNOCARDIÆ, 10% in Paraffin basis.

Sodii Chaulmoogras, Pure Commercial, from genuine *Taraktogenos Kurzii* Oil.

Dose.—1 to 3 grains (**0·06 to 0·2 Gm.**) thrice daily or to limit of toleration. Our conception is that if, as indeed we believe, there is curative value in Chaulmoogra against leprosy, the drug should be absorbed sufficient to saturate the system and it should be given over a long period. *cf.* paper by E. Muir, pp. 612, 613.

Manufacture.—Saponify genuine *Taraktogenos* oil by boiling with a sufficiency of strong soda lye and throw out the acid with hydrochloric acid. Wash with warm water until the wash liquor is free from acid and convert into the sodium salt.—W. H. M. See also H. C. T. Gardner, P.J. ii./22,154 and note by W. H. M. *Ibid.* 207.

Fractionation of Chaulmoogric Acid into portions.

We originated in 1915 the idea of fractionating the Chaulmoogra acids and introduced them as sodium salts for use. *Originally there were four fractions 'A,' 'B,' 'C' and 'D.' It was decided to group 'A' and 'B' as also 'C' and 'D.' There remain therefore 'A' and 'C' as described below.* We had pharmacological researches made with them before their use in man.

Sodium Chaulmoograte "A" *Martindale* comprises the salts of the higher acids with relatively high melting points. This compound salt contains the true Chaulmoograte and Palmitate and homologues, the acids of which have combined melting point of 50° C. approximately. It represents 50–75% of the total.

Sodium Chaulmoograte "C" (*free from Palmitate—Martindale*), comprising the lower acids with relatively low melting points. It contains the lower homologues with combined melting point of 25° C. approximately.

Whilst the "A" salt is not soluble in a proportion to permit of the ready administration of 3 or 4 grain doses, it can be given in pill form. Simultaneously the "C" chaulmoograte, which is readily soluble, has been used hypodermically. In this way the total active constituents of commercial Chaulmoogric Acid are utilised.

So far as we are aware no pharmacologist has been able to point to the real therapeutically active constituents of Chaulmoogra Oil and it is possible that a fractionation on these lines may enable us to separate the useful from the inert components. (*cf.* Theory of Action, p. 605)

Sodium Chaulmoograte "A" Pills and Gelatin Capsules, 1, 2 and 3 grains (**0·06, 0·12 and 0·2 Gm.**). are prepared.

Dose.—One thrice daily after meals or *ad lib.*

Sodium Chaulmoograte "A" Suppositories, 1, 3 and 5 grains (**0·06 0·2 and 0·3 Gm.**) or more are also made.

Sodium Chaulmoograte "C" Hypodermic Sterules, 1, 2 and 3 grains (0·06, 0·12 and 0·2 Gm.).

Dose.—An injection may be given deeply *under* the fat layers—this is stated to reduce reaction—once or twice a week or as found to be tolerated. *Note.*—Warm the Sterule slightly in a little hot water and shake to thoroughly emulsify.

We have had *no* adverse reports on the injection of Sodium Chaulmoograte "C." *cf.* Physiological Expts. *infra.*

The Superintendent of a Leper Asylum informs us privately that he Injection 'C' is much less painful in use than the Chaulmoogra Oil and Camphor Mixture.

Physiological Experiments with our Fractions.

From the work specially done for us (1915) with rabbits and cats (for details see Edn. XVIII., p. 609, 610), it became clear that weight for weight—comparing the results on animals with the dosage for man—three grains of our *"C" Fraction* ought *certainly to be tolerated even* ***in 20% solution intravenously,*** but the subcutaneous method would seem preferable.

This point was of great importance in view of the need to virtually saturate the system with the drug. Since that time most extensive use of these "C" injections has been made clinically.

Sulphuric Acid Test on "A" and "C" Fractions.

Both 'A' and 'C' Acid fractions give the recognised green colour with Sulphuric Acid common to Chaulmoogra Oil. It is preferable to have the fats in *excess* of the Sulphuric Acid. The 'A' responds with stirring in a minute or two. The 'C' gives it in almost the same time but is not so marked.

References.

Sodium and Potassium Chaulmoograte dissolved in water with addition of ½% Phenol. 1 to 2 grain doses have been given twice a week subcutaneously also Chaulmoogric Acid internally up to 40 grains daily. Anæsthetic cases showed marked diminution of the anæsthesia and return of heat and cold and tactile sensations as well as some gain in muscular power within 2 months. Tubercular leprosy also improved.—Sir L. Rogers, L. i./16,288,374.

Sir L. Rogers working subsequently to our own investigations, separated the total acids of Chaulmoogra Oil on lines almost identical with our own, and has communicated a paper on the subject. He expresses the opinion that it is very doubtful if the Chaulmoogric and Palmitic Acid fraction is of any value when given internally. The remaining acids which in his case have melting points 37 to 40° C. give soluble Sodium Salts. These combined Sodium Salts have been given *intravenously* in 2 to 3% solution with promising results—possibly of value also in tuberculosis. The intravenous method is preferred to the subcutaneous. He states that the most striking result is the occurrence of definite local reactions in the diseased tissue—sometimes accompanied by fever which has been seen in several cases after from 2/5 to 3/5 grain intravenously.—B.M.J. ii./16,550.

Chaulmoogric Acid has been stated to have the composition $C_{18}H_{32}O_2$ and Hydnocarpic Acid (previously called **Gynocardic**) $C_{16}H_{28}O_2$ (Dean and Wrenshall). If these formulæ are correct (see B.M.J. ref. for graphic) the acids are unique, for no other fatty acids with similar five carbon rings are known. They are both constituents of Chaulmoogra Oil. Dean was of opinion that Hydnocarpic Acid was more efficacious than Chaulmoogric Acid and that probably the acids with lowest boiling point were most effective. Walker and Sweeney found the acids specific against acid-fast bacilli.—B.M.J. ii./21 851.

Experiments on bactericidal values of Sodium Chaulmoograte and Sodium Morrhuate. The former failed to exercise an antiseptic action on organisms of the B. coli group but killed the bacteria of rat leprosy up to a dilution of 1—75,000. The inhibition of the growth of B. tuberculosis was carried out by concentrations of 1—10,000 to 1—20,000.—E. L. Walker and M. A. Sweeney, per T.D.B., Vol. 17/21,277.

Leprosy lesions tended to clear up under Sodium Gynocardate. L. Rogers found severe reactions from even 0·2 Cc. of 3% solution.—L. i./21,1178; B.M.J. i./21,640. See also Pr. Aug. '21,77.

Sodium Gynocardate intravenously has been disappointing, but Sodium Morrhuate, besides giving less severe local reactions, has led to definite improvement after 2 or 3 injections only.—W. W. Cadbury, per T.D.B., Vol. 17/21,279.

Sodium Gynocardate intravenously gave good result in the Philippine Islands.—B.M.J. i./22,240.

Leprosy. 25% of cases cured and other cases greatly improved in treatment of 120 patients with Sodium Gynocardate and Ethyl Esters of Chaulmoogra Oil.—D. J. Maxwell, Jl. Trop. Med., July 2/23,235.

Good results in long-standing infection from the use of Sodium Chaulmoograte (*Martindale*) in sufficient quantity to saturate the system to the limit of toleration, treatment extending over months. Eye affection improved, nodules diminished, bacilli disappeared from nasal mucus and anæsthetic condition of the skin improved. Intravenously 0·04 Gm. given every second day followed by an interval of 25 days after each twelve injections. In some cases a 1% or 1·5% solution was better tolerated than the 3% solution. Found to be one of the best anti-leprosy remedies, intense and rapid in action. —E. Balbi, Giornale Italiano di Dermat. e Sifilog. Fascicolo II., 1926, B.M.J.E., i./27.

A number of old-standing cases have recently (1927) been treated by S. M. Allievo at the ***Dermosyphilitic Clinic*** of the ***University of Cagliari*** with good results. Lesions and nodules in many cases disappeared and there was marked improvement in the condition of the patient and increase in weight. Most of the cases had received previous treatments with various medicaments, some of them lasting over considerable periods of time and involving hundreds of injections, without appreciable amelioration.

The injections of Sodium Chaulmoograte were given either intravenously or intramuscularly, and in some cases the course of intravenous injections was followed by an additional course of intramuscular, injections being given thrice weekly. The following is a typical course of treatment:

Treatment with Sodium Chaulmoograte was started following a month's rest from a previous course of Antileprol. In all, 40 intravenous injections were given and 50 intramuscular, in three courses, with 20 days' interval between each course, the treatment being combined with Hypophosphites by the mouth. Treatment lasted about 9 months, during which time the patient was given 6·58 Gm. Chaulmoograte intravenously and 8·88 Gm. intramuscularly. The first course of 40 injections was spread over 3 months, the second of 10 injections over 1 month and the third of 40 injections over 3 months. The injections were well tolerated.

TUBERCULOSIS.—A girl aged 15, with a sputum loaded with tubercle bacilli, had the injections and went through a full training as a nurse and died of a recrudescence of the disease 5 years after the injections. The evidence therefore was that the Sodium Chaulmoograte did good.—C. Milne, 5th May, 1927.

Unna's Chaulmoograte Pill.

Contained Sodium Chaulmoograte, Ginger and an aperient.

Magnesii Chaulmoogras. Phineas Abraham employed this compound in leprosy.—B.M.J. ii./92,1111,1198.

Ethyl Chaulmoograte. U.S.X. *Syn.* CHAULMARTIN, ✱MOOGROL (T.M. 410850).

Dose.—1 Cc. intramuscularly increased by 1 Cc. at every second or third injection until from 2 to 6 Cc. is reached. Injections are made deeply in the upper and outer quadrant of the gluteal region.

Intravenously, if the above is not tolerated, ½ Cc. increased to 1 Cc. usually once a week.

Manufacture.

Saponify the oil and precipitate the acids. Dissolve these in an equal weight of ethyl alcohol and pass in gaseous hydrochloric acid while heating under a reflux for 1 hour. Cool, pour into water and wash with sodium carbonate solution. Dissolve the oil in ether and dry with anhydrous sodium carbonate. Filter, and evaporate the ether.

To obtain colorless it may be necessary to distil *in vacuo*.

Characters.—A mobile liquid, almost colorless, with very slight chaulmoogra odour. Sp. Gr. 0·910 to 0·917 (U.S. X. 0·904). Slightly acid (5 Cc. require not more than 0·2 Cc. N/10 NaOH). Saponification value 195 to 200 (I.V. 90—100). M.pt. of mixed acids on saponification 40 to 45° C. —these data are according to our own experiments, 1923.

Uses.—It has been claimed that a preparation of this description would be superior for subcutaneous use. H. T. Holman and A. L. Dean (Jl. Cutaneous Dis. June, 1919,367 ; Pres. Feb. 21,86), point to reactions having been caused with subsequent improvement.

The Ethyl Esters of Hydnocarpus (*Wightiania* and *Anthelmintica*), and Ethyl Chaulmoograte in conjunction with Iodine have also been employed (*v. infra*).

The chief advantage in a preparation of this kind appears to be that it permits of the simultaneous use of *all* the acids of the oil, both high and low melting in the form of an injection into the tissues, but we are a little in the dark as to why the ethyl esters should be any more suited for the purpose than the Glyceryl Esters, which of course constitute Oleum Chaulmoogræ. To us these Ethyl Esters appear to be chemically too stable—little likely to be split up and absorbed.

Sir L. Rogers found the Ethyl Esters of Chaulmoogra fatty acids to be too irritating but hoped to do better with Ethyl Morrhuate.—Ind. M.G. Apl./20, p. 125. Further refs.—Pres. Feb./21,88.

The efficacy of Chaulmoogra in leprosy lies, apparently, not in the use of the Ethyl Ester, but in that of the whole oil, preferably in conjunction with Pyrogallol Oxide.—T. C. Ghosh, L. i./23,630.

Leprosy in Hawaiian Islands. Most prevalent during school age and most common in male sex. Ethyl Esters of Chaulmoogra Oil of benefit in most cases.—W. T. Corlett, per Jl. Trop. Med., Jan. 1/23,13.

The chief therapeutic agents are the Ethyl Esters of the fatty acids of Chaulmoogra, Hydnocarpus, Linseed and Olive Oils ; best given subcutaneously or intramuscularly with equal quantity of Olive Oil. Initial dose 0·25 Cc. of the ester, early injections twice a week intramuscularly. Larger quantities, 2 Cc. or more, injected in divided doses beneath nerve or skin lesions ; the tolerance limit varies from 1 Cc. up to 6 or 7 Cc. Three months' treatment on these lines in Purulia leper asylum resulted in much improvement in 9 out of 17 cases with Linseed and Olive esters, and in 12 out of 26 cases with Chaulmoogra and Hydnocarpus esters.—B.M.J.E., i./24,13.

Since 1921, 24 out of 300 lepers have been completely cured, and 30 discharged convalescent, at the Leprosy Hospital, Shorokutu Island (Japan), following continued treatment with Ethyl Esters of Chaulmoogra Oil.—K. Shiga, I.M.G., July, '26,355.

Iodised Ethyl Chaulmoograte.

As the fatty acids are in part 'unsaturated' it is possible to add Iodine to them, *e.g.* by the use of Iodine Monochloride.—J. T. McDonald and A. L. Dean, Public Health Rep., U.S.A., Aug. 20,20, p. 1959, reported favorably on the plain and Iodised preparation, but there was *no adequate experimental proof that the addition of Iodine improved effectiveness.* The hypodermic injections into leprous nodules are followed by marked swelling with ultimate recession of the nodules.

The standard preparation used in Honolulu and on Molokai, Hawaii, for weekly injection consists of the ethyl esters of the entire fatty acids of the whole oil chemically **combined with 2% Iodine** by weight. *Dose.*—1 Cc.

tramuscularly, increased by 1 Cc. at every 2nd or 3rd injection, until from 2 o 6 Cc. is reached according to age and weight of patient.

Iodised (0·5%) Ethyl Esters of Chaulmoogra Oil preferable to plain oil, vhich is irritating to tissues at site of injection and also to respiratory tract. —Per Jl. Trop. Med., July 15, '25,270.

Esters containing 1% Iodine used at Kalihi, Honolulu, Hawaii, resulting n paroling of 23% of all cases after 2 years' treatment.—H. E. Hasseltine, er Jl. Trop. Med., Jan. 1, '26,10.

Whereas under the old methods of treatment (including the Heiser-Mercado nethod) there were only 88 discharged cases in the Philippine Islands from 913-1921, since the introduction of the use of the Ethyl Esters (weekly ntramuscular injections with 0·5% Iodine added, heated until brown, to educe irritation) there have been 684 discharges from 1922-26. Particuarly effective in early cases, but even 15 to 20% of advanced cases can be ured if treated intensively under proper conditions.—H. W. Wade and C. B. Lara, L. i./27,599.

For oral use the mixed fatty acids combined with 2·5% Iodine have been iven in **Capsule** form. *Dose.*—0·25 Gm. per 100 lbs. body weight, three imes a day 1 or 2 hours after meals. This dose is gradually increased every two veeks until a maximum of 1 Gm. per 100 lbs. weight is given. In about two ears 78 patients after this treatment were discharged 'on parole.'—J. T. McDonald and A. L. Dean, Jl. Am. M. Ass., May 28/21; B.M.J.E. ii./21,5, T.D.B. Vol. 17,21,281. See also F. E. Wood, Jl. Trop. Med., Nov. 1/23,334.

The Treatment of Leprosy with Hydnocarpus Oil and its preparations.

Hydnocarpus Oil.

The pure oil 2·5 Cc., has been given twice weekly and increased by 0·5 Cc. in leprosy. The oil is tolerated well if injected into healthy subcutaneous tissues and only a very few lepers showed the mildest reactions.—Col. Med. Report, No. 209 (Straits Settlements), p. 41, per Jl. Trop. Med., June 1/27.

Hydnocarpus Oil, combining 4% Creosote, the cheapest and most effective remedy, and the one which did the maximum amount of good in all stages.—R. G. Cochrane, R.S.M. Discussion, B.M.J. i./27, 285.

Sodium Hydnocarpate.

A preparation obtained from the low melting fraction of *H. Wightiana* Oil has been used in leprosy, preferably 1% solution in 10 Cc. dose. Sir L. Rogers, Proc. Roy. Soc. Med. 1927, Vol. XX. Sect. Trop. Diseases, p. 146 *et seq.*

There are 160,000 lepers in British African Colonies, of whom only 7,200 are isolated or receiving treatment. An improved method of treatment by injections of soluble Sodium Hydnocarpates derived from Chaulmoogra Oils: exceedingly cheap, more active, and quite painless. Treatment with full doses twice a week for a year costs under 2s. 6d. Seeds of *Hydnocarpus Wightiana* have been distributed to all the Colonies, and Uganda has 1000 plants growing.—Sir Leonard Rogers, Tropical Life, Nov. '27,9.

Recent advance in treatment of leprosy and its bearing on prophylaxis.—Sir L. Rogers, Pr. Apl. '28,209.

Sodium Hydnocarpate "Sterules" 10 Cc. of 1% solution are prepared.

***Alepol** (T.M. 478,936). A selected fraction of the Sodium Salts of Hydnocarpus Acids.—P.J. i./28,209; Ind. Jl. Med. Res. Oct., 27, p. 501; L. i./28,73.

Dose.—1 Cc. of a 3% solution (increased) intramuscularly or subcutaneously; intravenously 1 Cc. of 1% solution increased by 1 Cc., up to 5 or 10 Cc.

Ethyl Hydnocarpate. *Syn.* HYDNESTRYLE, HYDNOCREOL (with 4% Creosote).

Esters of Hydnocarpus Oil (*H. Wightiania*), with equal quantity of Olive Oil, in doses from 0·5 to 10 Cc., intravenously or subcutaneously twice weekly, satisfactory in early cases of leprosy. Of no value where permanent lesions already exist. Effect enhanced by adding Creosote or Thymol to solution.—E. Muir, Ind. Jl. Med. Res., Oct. '24, per B.M.J.E., i./25,7.

This method, using Creosote 4% of the Mixture and subcutaneous infiltration twice weekly, initial dose ½ Cc. as stated, increasing by ½ Cc. has success in India.—R. G. Cochrane, L. ii./26,95.

Found useful at Dichpalli, Hyderabad. Of 180 patients treated in 1923-4 17% were symptom-free, 45% improved and likely to be symptom-free, 35% improved. and 3% worse or dead. Of infective cases 63% have become non-infective.—Isabel Kerr, L. ii./25,373. *See also* Proc. Roy. Soc. Med., 1927, Vol. XX., Sect. Trop. Diseases, p. 135 *et seq.*

The toxic action of Chaulmoogra Oil appears to be due to esters of Hydnocarpic Acid. Ethyl Hydnocarpate intravenously into rabbits causes lower Calcium content of blood, with associated hyposensitivity, followed by incoordination, death following respiratory failure. The toxic dose is 0·5 Cc. per kilo. for rabbits.—B. F. Read, Jl. Ph. and Exp. Therap., '24, p. 221.

Ethyl Esters of ***H. anthelmintica*** in prophylactic treatment of leprosy are used in the colonies of the Federation of Indo-China. 1st week, 1 Cc. is injected; 2nd week, 1·5 Cc.; 3rd week, 2 Cc.; until a dose of 5 Cc. is reached. Results sufficiently favourable for lepers to ask for injections. instead of rebelling against treatment as formerly. A marked improvement in the general condition is first noted, but after a time improvement becomes slower. The addition of ***Iodine*** to intramuscular injections ***discontinued*** as being too painful without increasing efficacy. The natives also employ pills containing a base of Hydnocarpus and Krabao, which are efficacious.—Presse Médicale, per Jl. A.M.A., ii./25,206.

Leprosy treated over a period of two years with intramuscular injections of the Ethyl Esters from *H. Anthelmintica* showed improvement in 71·1% of cases at Bangkok, the improvement being marked in degree in 22·7%.—China Med. Jl., per Jl. A.M.A., ii./25,931.

The giving of the **whole powdered nut of the Hydnocarpus tree** is the main treatment in a leper asylum in the Malay Peninsula. It is a very popular Chinese remedy, is palatable and inexpensive and is readily taken by women and children.—E. A. O. Travers, R.S.M. Discussion, B.M.J., i./27,285.

Further References on the Treatment of Leprosy.

A Self-Healing Disease.—Comparison with the well-known self-healing diseases—lobar pneumonia, enteric and small-pox. In these latter there is a short incubation period, rapid onset and rise to a climax when immunity has become sufficient to cause more or less rapid diminution and disappearance of the disease, the whole course being finished within a comparatively few days. In leprosy there is a similar process spread over as many *years.* Treatment has to depend on stages of the disease.

In the first stage the disease is present in limited form, with few bacilli in the body, little or no immunity and either diminished general resistance (temporary or permanent) or the presence of some other condition which is favourable to the increase of the disease. Diagnose and remove whatever diseased condition, environment or unsuitable diet is lowering tissue resistance. Induce immunity by injection of antigens. Defatted acid-fast antigens may be useful. Destroy the bacilli by injections of fatty acids—the **esters of the fatty acids of hydnocarpus—and chaulmoogra oils** specially useful. Counter irritation by infiltrating esters into the subcutaneous tissue under skin and nerve lesions, or by external use of 1 to 3% **Trichloracetic Acid** painted on to lesions every 6 or 10 days.

In the second stage—the same remedies, but with care. The bacilli are plentiful and there is danger, in the absence of acquired immunity, of further dissemination.

In the third stage. Where a fair degree of immunity has occurred all the above forms of treatment should be pressed. When large injections of the esters do not produce sufficient reaction give *Potassium Iodide*, beginning with ½ grain a day and working to limit of tolerance.—Ernest Muir, L. i./24, 277.

Chaulmoogric Acid 'C' Injection. *Martindale.*

Arising out of the last-mentioned work we put forward the suggestion to employ our low melting acid fraction *as such* or indeed *total* acids without neutralising or reconverting into esters. These preparations should prove reactive and, experience suggests, not too reactive in this obstinate infection.

Suggested Dose.—A 5% solution in Almond Oil of our 'C' fraction forms a slightly opalescent liquid without actually separating. *Doses* of 0·05 to 0·2 Gm. in the diluent mentioned would be worthy of trial.

Vaccine Treatment (J. Hasson) of a case of acute nodular leprosy originating in this country completely successful.—E. Graham Little, B.M.J. ii./26,1034. *See also* Criticism *ibid.* 1196. The action of Chaulmoogra preparations in leprosy is very unreliable and limited in scope.—J. Hasson, B.M.J. i./27,40. Results from the use of these preparations seem propitious in proportion to the remoteness of the reporter.—E. Graham Little, B.M.J. i./27,40.

Calcium in Leprosy, see Therapeutic Index.

✱**Avenyl** (T.M. 471499). For the treatment of leprosy complicated by syphilis. Hydnocarpus Oil with 0·25% of 2-Myristoxy-mercuri-3-Hydroxybenzaldehyde. *See* B.M.J., ii./27,102.

OLEUM EUCALYPTI.

Dose.—½ to 3 minims **(0·03 to 0·2 Cc.)** on sugar, emulsified, or mixed with olive oil. U.S. *average dose* 8 minims.

Eucalyptus Oil is distilled from the leaves of numerous species of Eucalypti. *B.P.* '14 from E. Globulus, E. dumosa and other species.). The oils which contain the greatest percentage of Eucalyptol are used chiefly for pharmaceutical purposes and the species now being distilled for oils of this class are *E. Polybractea, E. Cneorifolia, E. Odorata, E. Smithii, E. Globulus, E. Australiana, E. Oleosa,* and a few others. As the yield of oil varies greatly with the several species this is a controlling factor. The rectified oils of *E. Polybractea* and *E. Australiana,* are water white, those of the other species mentioned are tinged slightly yellow when freshly distilled. This peculiarity is due to the phenols differing in the two chief groups. Oils which contain as much as 70 to 80 per cent. Eucalyptol are now well known, *e.g., E. Polybractea, E. Smithii,* etc. and have a pleasant, fragrant smell. The oil from *E. Citriodora* has an odour resembling Lemon-grass. We are indebted to Mr. George Inglis Hudson, of Glebe, Sydney, Australia, for assistance in bringing our information up to date, and in particular for sending us the papers of Mr. H. G. Smith who has done useful research in Eucalyptus Oils.

The oil from *Eucalyptus Smithii* distilled by steam is one of the richest in Eucalyptol content (up to 85%) of all Eucalyptus species examined. The terpene is dextrorotatory pinene; and the yield is also good—20 to 26 lbs. from the leaves and branchlets that can be packed in a 400 gallon tank. The volatile cough-producing aldehydes so objectionable in the oils of many species yielding a cineol-pinene product seem to be largely absent from this oil. Shaking with very dilute Sulphuric Acid and afterwards washing and treatment with Sodium Carbonate removes impurities (iron from tank). It is an excellent species from the cultural point of view.—H. G. Smith, Jl. Proc. Roy. Soc., N.S. Wales, XLIX (1915).

See also "The Botanical and Chemical Characters of the Eucalypts and their Correlation." British Association Meeting, Section B. Manchester, 1915.

B.P. '14 requires at least 55% Eucalyptol. The oil ozonizes the atmosphere whilst oxidising. The pinenes contained have the principal action in this direction. B.pt. between 338° and 392° F.; Sp. Gr. 0·910 to 0·930. It should not cause much coughing when inhaled—absence of volatile aldehydes. The unpleasant penetrating and irritating odour of the crude oils is occasioned by different aldehydes, especially valeric aldehyde. *Further information Vol. II.*

Soluble in oils, fats, paraffins, about 3 in 1 of 90% alcohol, in about 3 to 5 vols. of 70% alcohol (*B.P.* '14 states, 5 vols.), and in all proportions in absolute alcohol.

Uses.—Antiseptic, a popular prophylactic, inhaled or sprayed for influenza and bronchial catarrh. Useful mixed with an equal quantity of olive oil as a rubefacient for rheumatism.

Scarlet Fever has been treated by inunction of the Oil over the entire body but it is of doubtful efficacy.

In cholera epidemics Eucalyptus Oil 10 minims twice daily has a definite prophylactic effect.—Brooke, 166.

In measles, **Milne's Method** was to rub Eucalyptus Oil all over the body excepting face and hands, morning and night for the first four days, afterwards once a day until the tenth day. Tonsils and pharynx to be swabbed with 10% Carbolic Oil every two hours for first 24 hours or irrigate mouth and throat daily with weak Alum Lotion and Glycerin of Borax applied to interior of mouth and to the gums. Mortality lowered.

Typhoid fever has been treated by 10 minim doses of Eucalyptus Oil. The oil must contain a sufficiency of ozone due to oxidation of the terpenes—or with advantage a little hydrogen peroxide may be added. There is a marked reduction in temperature.

Ankylostomiasis has been treated with good results by Eucalyptus Oil. Two formulæ (i.) weak—Eucalyptus Oil 2 Gm., Chloroform 3 Gm., Castor Oil 40 Gm. (ii.) strong—Eucalyptus Oil 2·5 Gm., Chloroform 3·5 Gm., Castor Oil 40 Gm. *Dose.*—$\frac{1}{4}$ to $\frac{1}{2}$ of either according to age and condition of patient. Also successful for tapeworm and threadworm, but we doubt if specific—see Ol. Chenopodii.

Colds may be treated by steam inhalation with the oil, also internally 10–15 minims on sugar every 3 or 4 hours. See also Oleum Cinnamomi.

Poisoning effects from 1 to 6 drachms are recorded. Effects were gastro-intestinal irritation and cerebral paresis with vomiting and diarrhœa. Treatment by external stimulation, as on the lines of Opium poisoning.

Eucalyptus and castor oil taken in error for plain castor oil. Camphor given hypodermically. Three doses improved condition of patient. Recovery.—L. M. Chesney, L. i./26,131.

A pugilist took 3 drachms, as suggested by a 'drop.' Intense drowsiness —complete hypnotic effect.—P. C. Garrett, B.M.J., i. /25,1172.

Poisoning caused by about $\frac{1}{2}$ ounce of Eucalyptus Oil. The patient was cyanosed and was treated with Strychnine 1/60 grain hypodermically and Mustard 2 drachms by the mouth: after vomiting, the stomach was washed out with water.—P. Gibbin, B.M.J., i./27,1005. See also *ibid.* 1133, and A. Neale, B.M.J., ii./27,520.

Eucalyptol, U.S., Fr. Cx., F.E.—*Syn.* Cineol; Cajuputol.

$C_{10}H_{18}O=154\cdot144$. *Dose.*—1 to 4 minims **(0·06 to 0·25 Cc.).**

Is that portion of eucalyptus oil which passes over between 347°

and 351° F., and crystallizes at 30° F. It is preferred to the crude oil for use in the oro-nasal inhalers, as it does not dry up as a varnish. It may be obtained from the oil by the action of phosphoric acid (Faulding's Process), with which it forms a crystalline compound.

Eucalyptol Phoshate. On addition of water, this splits up setting free Eucalyptol. It is however not difficult to prepare Eucalyptol by **Freezing.** The Eucalyptol made by the cooling process is of absolute purity. Pure Eucalyptol is optically inactive.—G. I. Hudson.

Tinctura Eucalypti (Foliorum), B.P.C.

Dose.—15 minims to 2 drachms.

Eucalyptus leaves in No. 20 powder in alcohol 60% 1 in 5.

Hæmorrhage from superficial wounds is stated to be capable of arrest by internal use of calcium chloride combined with local application of this tincture.

Sterules, Hypodermic, of **Eucalyptus Oil,** 5 minims with **Olive Oil** 12 minims. This injection into the buttocks for bronchitis has given good results. May be increased to Eucalyptus Oil 10 minims, Olive Oil 5 minims.—A French prescription.

Pigmentum Olei Eucalypti et Acidi Salicylici.

Eucalyptus Oil 8, Salicylic Acid 1, Olive Oil to 64.

Eczema capitis has been cured by this preparation, rubbed into the scalp twice a week. Success attributed to the Eucalyptus Oil. The disease had spread behind the ears and fissures had developed —both meatuses were attacked. The ears were syringed with Carbolic Lotion 1 in 80 and the Eucalyptus Oil applied to the meatus on a pledget of cotton.

Unguentum Eucalypti et Acidi Borici.

Eucalyptus Oil 40, Boric Acid 120, Soft Petroleum to 500. Lessens secretions of rhinitis. 'High Melting' Vaseline is preferable in hot weather.

Vapor Eucalypti, T.H.

Eucalyptus Oil 20 minims, Light Magnesium Carbonate 10 grains, Water to 1 ounce. A teaspoonful in a pint of hot water. (**Vic. Park** has double quantity of oil.)

Vapor Eucalypti Compositus, R.F.H.

Eucalyptus Oil 2, Compound Tincture of Benzoin 3, Thymol 1. Spirit of Chloroform to 8. 10 drops at a time to be inhaled through an inhaler, *e.g.*, the 'Ozonic.'

Nebula Eucalypti Composita.

Form A.—Eucalyptus Oil 5 minims, Cinnamon Oil 2 minims, Menthol 12 grains, Liquid Paraffin containing 2% Aristol to 1 ounce. A small quantity sprayed into the nostrils at bed time, and occasionally afterwards if suffering, is said to be a cure for a common cold.

Form B.—Eucalyptus Oil 5 minims, Wintergreen Oil 5 minims, Menthol 5 grains, Liquid Paraffin to 1 ounce.

✱**Eumenthol** (T.M. 297687, 301214) **Jujubes (Hudson).**
Contain the active constituents of *E. Polybractea* Oil, *Thymus Vulgaris, Pinus Sylvestris, Mentha Arvensis* with Benzo-borate of Sodium. Antiseptic and effective.

OLEUM MORRHUÆ.

Syn. **Oleum Jecoris Aselli.**

French—*Huile de Foie de Morue.* German—*Lebertran*
P. Ital.—*Olio di Fegato di Merluzzo.*

Dose.—1 to 4 drachms (**4 to 15 Cc.**).

The oil (*B.P.* '14) is separated from the livers of codfish, *Gadus Morrhua* (*Teleostei*), by means of steam at a temperature not exceeding 85° C. It is then cooled to a temperature of about—5° C. and the liquid portion, producing the "non-freezing" oil of commerce, is pressed through canvas. Inferior brands are prepared by heating.

The selection of Cod Liver Oils for medicinal use. Newfoundland oils equal to Norwegian.—J. C. Drummond, L. ii./25,679.

U.S. X. states 'and other species of *Gadus*'. The oil may be assayed for Vitamin 'A' potency and should then contain at least 50 units per Gm.

For further detail of Characters and Tests and Vitamin Assay Methods, see Vol. II.

Soluble.—1 in 2 of Ether, slightly in Absolute Alcohol.

Flavoring.—Syl Lavandulæ, Glyl Pini, or as Emulsion.

The following mixtures of essential oils have been suggested for the purpose: Oleum Amygdalæ Essentiale 2½, Oleum Cinnamomi 7½, Oleum Limonis 16. Further, Oleum Amygdalæ Essentiale 4, Oleum Gaultheriæ 2½, Oleum Cinnamomi 6½, Oleum Myristicæ 2½, Chloroform 5½.—P.J. ii./09,758.

To cover the taste may be taken with a little salt, Worcester Sauce, in steel or orange wine, coffee or milk.

Uses. –Nutritive, nervine tonic given in rickets, phthisis, chronic bronchitis, general debility and malnutrition.

Cod Liver Oil is rich in **Vitamins 'A' and 'D'** For information regarding its use in rickets and other Vitamin deficiency diseases the chapter on **Accessory Food Factors** (p. 592) should also be consulted.

Active concentrated Vitamin preparations are obtained by separation of the ***unsaponifiable portion*** (*see* p. 618). *For Vitamin D Preparations see Radiostol.*

'Unsaturated' Fatty Acids.—The older theory of the late O. T. Williams and others was that in tuberculosis the **value of Cod Liver Oil** depends on the fact that the liver has the power of decomposing fats and yielding these acids to the blood. These have chemically a loose double linkage and are capable of exerting chemical action more markedly. Fish, particularly Cod Liver, and vegetable oils are ***richer in these constituents than animal oils.*** The effects of Cod Liver Oil on the acid-fast properties of the tubercle bacillus showed that the oil had attacked the waxy coating of the bacillus and rendered it, after several months, non-stainable by the usual methods.

For this and other theoretical aspects (*e.g., Nitrogen Metabolism*), *see Vol. II.*

Trypanosomiasis.—It has been reported on (in conjunction with organic arsenic) favourably. Should be tried in a large number of cases.—Bagshawe.

Typhoid Fever.—Cod Liver Oil appreciably diminishes mortality.—Per Jl. Trop. Med., Mar. 2, '25, 115.

To allay skin irritation Cod Liver Oil 2 mixed with Huile de Cade 1 has been ordered to be applied with a shaving brush.—Ph. Notes.

Rickets.—One of the benefits of Cod Liver Oil is due to its forming a soluble soap with calcium.—B.M.J. i./11,500. (Subsequently the Vitamin content theory had support and *more* recently Cod Liver Oil *plus* Lime. For further information see Vitamins).

Tuberculosis. Blood Calcium.

Dietetic conditions influencing the calcium content of the saliva. A high calcium content can be produced by a diet having a large fat soluble Vitamin content; a low calcium content by a diet with much cereal and comparatively little fat soluble Vitamin. Tuberculous children appear to have a lower calcium content than normal.—C. Lee Pattison, B.M.J. ii./26,6.

Ingestion of Cod Liver Oil causes greater increase of blood Calcium than ingestion of food or Calcium salts alone and results in a decrease of the coagulation time. Cases of pulmonary hæmorrhage, in which there is increase of coagulation time, should benefit by this treatment. As oral administration of Calcium salts is followed by rapid rise of blood Calcium, intravenous injections of these salts appear to be unnecessary.—Am. Review of Tub., per Jl. A.M.A., ii./25,66.

When a patient is for any reason on a ' + Lime ' diet Cod Liver Oil should be given.—*cf. Digestive Tract*, p. 256.

LARYNGEAL AND TRACHEAL TUBERCULOSIS treated by INHALATION and SPRAYING of Cod Liver Oil.—B.M.J.E., i./26,60.

TUBERCULOUS ABSCESSES OR FISTULÆ well treated by INJECTION of neutralised and sterilised Cod Liver Oil, combined with Bismuth Carbonate. Penetrates farther than Beck's Paste, owing to greater fluidity. Results justify further treatment.—B.M.J.E., ii./24,54.

Capsules of Cod Liver Oil 19 minims **and Creosote** 1 minim are for use in phthisis, also made plain 20 and 30 minims. **Capsules of Cod Liver Oil** (½ drachm) with **Blaud Pill** (4 grains). Ingredients, Sodium Carbonate and Ferrous Sulphate 2 grains each. The Ferrous carbonate in *statu nascendi*.

Emulsio Olei Morrhuæ (50%). (Martindale).

Dose.—2 to 8 drachms (7 to 30 Cc.).

Soak Irish Moss 2 drachms in Water 12 ounces, six hours, boil and strain off 10 ounces. Allow to cool and add in three portions Cod Liver Oil 12 ounces. Then add Simple Tincture of Benzoin 1 ounce, Alcohol 90% 1 ounce, Essential Oil of Bitter Almonds 10 minims, Elixir of Saccharin 10 minims. This produces a good white preparation.

Ferrated Emulsion of Cod Liver Oil consists of the plain Emulsion with Citrate of Iron and Ammonium 5 grains per ounce.

Emulsion of Cod Liver Oil with Glycerophosphates, *v.* p. 40.

Emulsio Olei Morrhuæ et Hypophosphitum.

Dose.—2 to 8 drachms (7 to 30 Cc.). Contains the Hypophosphites of Sodium and Calcium, of each 1%, in the form for **Emulsio Olei Morrhuæ** *antea.* This is a permanent Emulsion. Gum Acacia produces a white Emulsion, but not so permanent.

Emulsio Olei Morrhuæ cum Lecithin is the above with 5 grains of Lecithin per ounce. *Dose.*—2 to 8 drachms (7 to 30 Cc.).

The Lecithin is to be incorporated with the above finished Emulsion. Pharmaceutically, it is elegant and palatable.

Note.—We found that 5 grains of Lecithin will only emulsify about ½ drachm of Oil in a formula of this description so that there is insufficient to do this without the aid of Irish Moss.

Emulsio Olei Morrhuæ et Iodoformi.

Consists of the plain Emulsion with ¼ grain of Iodoform added to the dose, *t.d.s.* Was found of benefit for tuberculous children.

Emulsum Olei Morrhuæ, U.S. X.—Thoroughly mix Acacia Gum 125 with Cod Liver Oil 500, then add at once Water 250 and emulsify. Add Methyl Salicylate 4 (or any other flavoring, *q.s.*) and Syrup 100, and Water *q.s.* to 1,000.

Emulsio Olei Jecoris Ferrata.—P. Svec. X. has Cod Liver Oil 300, Calcium Hypophosphite 6, Citric Acid 2, Iron Pyrophosphate with Ammonium Citrate 9, Gum Acacia 53, Syrup 60, Vanillin 0·6, dissolved in Dilute Alcohol 5 and Water to 600.

Oleum Jecoris cum Iodo. *Syn. Olio di Fegato di Merluzzo Iodato.* P. Ital. Contains 0·05% Iodine dissolved by trituration. To be freshly made.

Oleum Morrhuæ Aromaticum.

Dose.—1 to 4 drachms.

Coumarin 0·01, Saccharin 0·5, Vanillin 0·6, Absolute Alcohol 10·0, Lemon Oil 20·0, Peppermint Oil 3·0, Cod Liver Oil to 1,000. The taste is covered but the odour persists to some extent.

✱ **Oviol** (T.M. 429023). A preparation containing 52% Norwegian Cod Liver Oil with eggs.

Cod Liver Oil Vitamin Concentrate.

There are several preparations available which claim to contain the Vitamins of Cod Liver Oil in a concentrated and palatable form. They are made by isolation of the unsaponifiable fraction of the oil. The following method is stated to yield a concentrated extract containing the active antirachitic substance.

The oil is extracted with Formic or Acetic Acid, and the acid extract, amounting to about 5%, is saponified with Alcoholic alkali. The soaps are extracted with Ether. This extract gives on evaporation an active brown semi-crystalline residue amounting to about 0·1% of the original oil. During the process air must be excluded, and the product is stable for seven or eight months when excluded from air. A 1 Gm. tablet may be prepared, which, it is claimed, represents the therapeutic activity of a tablespoonful of the oil.—P.J., ii./25,394.

An Ether solution of a concentrate of Cod Liver Oil intramuscularly in rickets had similar effect to the oil given *per os.*—Per Pr., Mar. '27,199.

✱ **Ostelin** (T.M. 447886).—A liquid preparation containing the Vitamin D, responsible for Calcium-Phosphorus metabolism. 4 minims of it are stated to be equivalent to 1 drachm of Cod Liver Oil. Available in Glycerin suspension and in combination with Malt Extract and Orange Juice, a palatable preparation containing the equivalent of 50% Cod Liver Oil: and in tablets containing 4 minims combined with Calcium Glycerophosphate 2 grains.

✱ **Oscodal** (T.M. 480078).—In tablets. *Dose*:—½ to 2. Adults 2 to 3 thrice daily. Stated to contain Vitamins A and D.

✱ **Codlivex** (T.M. 460647).—Stated to represent the active principles of the oil in the form of Milk Chocolate Pastilles which contain the lipoid of the Cod Liver. One is equivalent to one tablespoonful of Cod Liver Oil. Suitable for children and adults.

✱ **Moruette** (T.M. 455426) **Cod Liver Oil Tablets** are prepared on similar lines. They contain the fat-soluble Vitamin A, alkaloids of the Leucomaine class, Cholesterol and Lipochrome-containing bodies, also Phosphorus, Bromine and Iodine.

Sodium Morrhuate—the sodium salts of the unsaturated fatty acids of Cod Liver Oil after extraction by ether—a 3% solution sterilised with ½% Phenol added is used.

Dose.—Subcutaneously ½ Cc. slightly increased up to 2 Cc. 2 or 3 times a week until reaction (febrile and local) occurs. When 2 Cc. has been reached give this dose *intravenously* up to 4 Cc.

The theory is that the sodium salts of the unsaturated fatty acids of this and chaulmoogra oil act in some way on the coating of the acid-fast bacilli, the coating of tubercle bacilli having been shown to contain palmitic and unsaturated fatty acids.—Sir L. Rogers, B.M.J. i./19,147.

Improvement in 2 or 3 cases of leprosy after 2 or 3 injections only of Sodium Morrhuate.—W. W. Cadbury, per T.D.B. 17/21,279.

Report of Mission to Lepers. Sodium Morrhuate in treatment of 117 cases gave good results.—Per T.D.B., Vol. 17/21,286.

Animal tuberculosis. Sodium Morrhuate, Soyate and Hydnocarpate of no avail.—Sir L. Rogers, Pr. Aug. 1921, p. 98, but *vide* also B.M.J. ii./23, 1251.
In lupus Sodium Morrhuate hopeful.—Sir L. Rogers, B.M.J. i./21,640.

Cod Liver Oil Substitutes. *See* **Maltolivine, ✱Marrubin** (T.M. 261511), **Emulsio Olei Olivæ, Syrupus Tann-Iodo-Phosphoratus.**

Since the nutritive value of Cod Liver Oil appeared to be due, before the discovery of Vitamin A, to its content of unsaturated fat, it was thought that possibly some of the unsaturated vegetable oils might be used therapeutically.

The following oils have a high Iodine value, this number being proportional to the degree of unsaturation :

Cod Liver Oil 126—166.
Poppy Seed Oil 138·1.
Sunflower Seed 136·1.
Soya Bean 122.
Maize Oil 111.

Of these, **Poppy Seed Oil**, largely sold as *Salad Oil* (Huile d'œilette), was thought the most suitable. Administered as **Emulsio Olei Papaveris.** *Syn.* ✱Pavimol (T.M. 362836). *Dose.*—½ to 1 ounce thrice daily—it has been used in malnutrition.

The vegetable oils contain no Vitamins A or D.

Dugong Oil from two species of halicore, sebaceous animals inhabiting the rivers and bays of N. and E. Australia, may have some value.

G. Watkins, Brisbane, writes he has seen it used externally many times on persons suffering from wasting disease with most beneficial results. Properly prepared it is far superior to Cod Liver Oil. There is, however, a great limit in the production. The calf is three or four years in reaching maturity—only one is produced per year.—C.D. i./13,886

Mutton Bird Oil as a substitute for Cod Liver Oil—the oil of the young Sooty Petrel collected on the Stewart Island south of New Zealand advocated for feeding in phthisis and bronchitis.—J. S. Purdy, B.M.J. i./18,174.

OLEUM OLIVÆ.

Dose.—¼ to 1 ounce (8 to 30 Cc.).

The oil expressed from the ripe fruit of *Olea europæa* (*Oleaceæ*).

Inferior brands are obtained by addition of the pulped fruit to boiling water and by fermentation processes. *For detail of Tests see Vol. II.*

Uses.—Olive Oil is a nutrient and has laxative properties (*vide infra*). Often gives relief to patients who have gall stones. It is frequently used warmed to about 90° F. as rectal injection, as much as 10 ounces at bedtime for constipation. In typhoid ½ ounce doses *per os*, and a breakfast-cupful by the bowel daily gives great relief.

Capsules (Gelatin) of Olive Oil, each containing ½ drachm.

These capsules are also prepared **Formalised** (**Formagules**) for lubricating the intestines in cases of habitual constipation.

Olive Oil in ½ to 2 ounce doses has been recommended for the treatment of gastric ulcer given by stomach tube if necessary. It is said to inhibit the secretion of hydrochloric acid. Hyperchlorhydria is generally associated with gastric ulcer.—H.

For chronic constipation also gastric ulcer, fissures, hyperacidity and pyloric spasm. Greatly superior to Silver Nitrate or Bismuth and Belladonna. Can be given for long periods and is harmless.—Med. Press, 1917, 154, p. 221. P.J. i./17,275.

Chronic colitis treated with from 8 to 10 ounces of washed Olive Oil, warmed to 100° F., injected per rectum at low pressure and retained all night—injections should be continued nightly for a fortnight.—L.ii./23,1411.

Enema Oleosum L.H.
Olive Oil 4, Soft Soap 1, Warm Water 16.

Emulsio Olei Olivæ. *Dose.*—1 to 2 ounces.
Olive Oil 1 ounce, Gum Acacia Powder 25 grains, Simple Syrup ½ ounce, Water to 4 ounces.

Oleum Olivæ depuratum atque sterilisatum.—Fr. Cx., 1908. Wash Olive Oil 100 with Alcohol 95% 30 in a bottle, shaking occasionally; separate the Alcohol and repeat. Then heat the oil for 10 minutes on a sand bath at a temperature not exceeding 115°. Preserve in 50 Cc. sterile bottles. This is now replaced (Fr. Cx. Supp. Nouv. 1926) by **Oleum Olivæ Neutrale Factum.** *Syn.* **Huile d'Olive Neutralisée**, using Sodium Carbonate to neutralise acidity.

Maltolivine. *Dose.*—2 to 4 drachms (8 to 15 Cc.).
A combination of Olive Oil and Malt Extract, as a substitute for Cod Liver Oil. A nutrient in emaciated and wasting conditions and in colitis of children.

OLEUM RICINI.

Dose.—1 to 8 drachms (4 to 30 Cc.).

Expressed from seeds of *Ricinus Communis* (*Euphorbiaceæ*). ***Soluble*** about 1 in 4 or less of Alcohol 90%. Also soluble in ether and glacial acetic acid. Sp. Gr. 0·958 to 0·970. (*B.P.* '14.) Saponification No. 180, Iodine No. 84. The seeds, but not the oil, contain the poisonous protein Ricin; the 'press cake' therefore is poisonous. The purgative action is due to the fatty acids, of which ricinoleic is a principal member.

(Ricin.—A vegetable toxin or toxalbumin is tremendously potent. When small doses are injected hypodermically immunity is produced, antiricin being formed. This fact paved the way for the foundation of serum therapeutics.—P.J i./15,156.)

Total acidity of the oil (as oleic acid) should not exceed 1%.

Pharmaceutical Oil as distinct from Soapmakers' and other industrial oil does not deposit in cold weather.

Flavoring.—Prescribed as Oleum Ricini Aromaticum, or with 2 drachms of Tinctura Cardamomi Composita to the ounce, or in capsules, or as 'Maricol.'

Uses.—A mild but effectual purgative rarely causing pain. It is rendered more efficacious when mixed with an equal quantity of Glycerin. The oil rubbed on the breasts will often increase the flow of milk. Castor oil is a soothing application to the conjunctiva, and is employed for making solutions of the alkaloidal bases (*q.v.*).

In sprue 1½ drachms every morning.—Cantlie, B.M.J. ii./05,1281.

Pharmacology.—It passes the stomach unchanged; on reaching the small intestine it is saponified by the alkaline pancreatic secretion, being converted into Glycerin and Ricinoleic Acid. This acid is irritant to the epithelium of the intestine thus causing impulses to pass to the local nerve plexus and then to the wall of the intestine. This causes the muscle to contract more—that is, increases the peristaltic movement of the intestine, and thus the contents are hastened on. If the oil were given saponified the Ricinoleic Acid would cause irritation and produce vomiting.—D. Grieve, P.J. ii./21,490.

Capsules of Castor Oil contain ½ or 1 drachm.

Capsules of Castor Oil, Compound, contain Croton Oil ¼ minim, with Castor Oil 8 minims. *Dose.*—One or two.

Enema Olei Ricini.—Castor Oil 1, Olive Oil 4. *Dose.*—5 to 10 ounces.

Oleum Ricini Aromaticum. *Dose.*—1 to 8 drachms.

Vanillin 1 grain, Peppermint Oil 10 minims, Saccharin 4 grains, Absolute Alcohol 60 minims, Tincture of Alkanet 1 in 5 Alcohol (90%) 10 minims, Castor Oil 4 ounces. The taste is covered: for children.

Castor Oil Solutions of Alkaloids.

Uses.—Instillation of Castor Oil to the eye allays the irritation caused there by foreign bodies. The alkaloidal bases (not their salts dissolved in Castor Oil are used in ophthalmic work. They keep well. A D P1 2% solution of the combined bases Homatropine and Cocaine have been of great service (*q.v.*). Solutions 1% respectively of P1 Atropine, Cocaine (D P1 4% will dissolve), Ⓟ Gelseminine, Ⓟ Homatropine, P1 Hyoscine, P1 Hyoscyamine, and Ⓟ Pilocarpine have also been used. Physostigmine (Eserine) is used in Ⓟ ½% solution. R.O.H. has D P1 1% with Cocaine 2%. Morphine is barely soluble in it to the extent of D P1 ½%. *In making these avoid excessive heating.*

Homatropine and Cocaine of each 2% in Oil is the most efficient cycloplegic.—N. Bishop Harman, B.M.J. i./20,599.

Corneal ulcers have been treated with **Oleum Scarlet et Atropinæ,** *q.v.*

Unguentum Olei Ricini Compositum L.H.
Zinc Oxide 1, Soft Paraffin 2, Hydrous Wool Fat 2, Castor Oil 3.

Sodii Sulphoricinas. *Syn.* TURKEY RED OIL.
$C_{17}H_{32}O.SO_3H.COONa = 400·325$.

Prepared by the action in the cold (not exceeding 50° C.) of sulphuric acid 1, on castor oil 3 (sulphurous acid must not be evolved), washing with plenty of water and nearly neutralising the product with soda. It is used in the form of suppository as a purgative.

Concentrated solution of Sodium Sulphoricinate will dissolve iodine, resorcinol and naphthalene, forming strongly antiseptic solutions.

It was employed as a Glycerin Substitute in the war *e.g.* in hair preparations.

Ⓟ **Phenol Sodio-Sulphoricinate.** A mixture of phenol 1, and sodium sulphoricinate 4, is a yellowish brown thick syrup miscible with water. Used in 20 to 50% solution for papilloma and tuberculosis of larynx and ozæna.

Pharyngo-keratosis (mycosis) has been treated with 10% solution, also 10% solution of Salicylic Acid in the sulphoricinate.

Magnesii Ricinoleas. *Syn.* '**Maricol.**'

Dose.—1 to 4 drachms (4 to 15 Gm.).

A white powder, employed in several proprietary preparations known as 'Castor Oil Powders.' Some Castor Oil Pills, however, contain Calomel without Oil.

As much as 50% of Castor Oil can be incorporated in this way, but the compound is not a soap. The oil is for the most part free.

✱Iodicin (T.M. 376644). *Syn.* **Calcium Iodo-ricinoleate.**—As an innocuous mode of giving Iodine without upsetting digestion, being absorbed from the bowel. **Capsules** 3 grains. In syphilis and ulcerated wounds used with advantage.

Ethyl Iodo-Ricinoleate. *Syn.* ✱ETHIDOL (T.M. 437469). *Dose.*—3 grains (**0·2 Gm.**) in capsules.

A preparation containing 20% combined Iodine and can be heated 100° C. Stainless, non-irritating locally when used by inunction, almost colourless, and miscible with almond or olive oil.

Can be employed as injection in rheumatoid arthritis, tuberculous and scrofulous glands, and administered in epilepsy. Successful results have followed inunction in simple goitre and rheumatoid arthritis.—L. i./25,722.

OLEUM SANTALI.—In numerous Pharmacopœias.

With data as to Copaiba and Cubebs.

Dose.—5 to 30 minims (**0·3 to 2 Cc.**).

Santal or Sandal Wood Oil is distilled by steam under pressure from the wood of *Santalum album* (*Santalaceæ*), the yield being from 1 to 6%. A yellowish oil, with an aromatic odour and pungent taste. Consists to extent of 90% of the Alcohol Santalol. (Some Pharmacopœias specify less). Sp. Gr. 0·973 to 0·985 (*B.P.* '14).

It is now generally held that *Santalum album* is a root-parasite, and that in the absence of suitable host plants, it fails to succeed.

For further Characters, Tests and Notes on Manufacture, see Vol. II.

Soluble in all proportions in alcohol 90%. Readily in ether and chloroform.

Flavoring.—Best given as Capsule.

Uses.—Internally in chronic bronchitis, *e.g.*, a few drops taken on a lump of sugar is found to relieve cough without expectoration. Is much employed in the treatment of gonorrhœa and gleet. It quickly checks the discharge in dose of 15 minims 3 times a day, and with the use of permanganate, zinc and silver nitrate injections gives good results; also in 10 minim capsules, for chronic cystitis, with benzoic and boric acids, as adjuvants.

Urinary infections due to the Staphylococcus. The oil has an almost magical effect.—W. K. Irwin, B.M.J. ii./25,37.

Relative low toxicity of Sandal Wood Oil in comparison with phenol.—L. ii./25,1198.

Benzyl Alcohol as adulterant.—P.J. ii./26,680.

Australian Sandal Wood Oil is derived from *Fusanus Spicatus* and is largely used in Australia and other countries. This oil might replace the more expensive oil from *S. Album.*

Santalol. *Syn.* $C_{15}H_{24}O$.

Dose.—3 minims (**0·2 Cc.**) 6 to 12 times a day. The use of Santalol as distinct from its parent substance the oil has been advocated. Even in large doses there is no disturbing influence on the stomach or kidneys in gonorrhœa, cystitis, vesical and bronchial catarrh.

Santalol Capsules contain 5 minims (**0·3 Cc.**).

Santalol Formagules, 5 minims (*cf.* Formagules) are also made.

Santalol Tablets contain 3 minims of Santalol. *Dose.*—One tablet 6 to 12 times a day. To be swallowed whole.

Santalol-Methyl-Salicyl Capsules contain 4 minims (**0·25 Cc.**) with 1 minim (**0·06 Cc.**) Methyl Salicylate. The combination is useful in gonorrhœa.

Santalyl Salicylate. *Syn.* **Salicyl Santalol.** ✱SANTYL (T.M. 275172). $C_{15}H_{23}C_6H_4.OH.COO = 340{\cdot}224$.

Dose.—15 to 30 minims (**1 to 2 Cc.**).

Manufacture.—We suggest heating Sodium Salicylate and Sodium-Santalol with Phosphorus Oxychloride. For a note on a patent since revoked, see Edn. XVIII., p. 623.

Yellow Oil with balsamic odour free from acrid taste. Stated not to irritate the stomach or kidneys; given for urethritis and cystitis.

Capsules of Santal Oil are prepared, containing 5, 10, 15 and 20 minims in each. **Gonal Capsules** are similar.

✱ **Savaresse's** (T.M. 11416) **Capsules** contain 10 minims, and are prepared with an animal membrane, and it is claimed are less nauseating as they generally remain entire until they have passed the stomach. The patent described.—P.J. i./07,538.

Capsules of Santal Oil 5 and 10 minims **with Methylene Blue** ½, 1 and 2 grains are prepared.

Mistura Olei Santali. *Dose.*—One ounce (**30 Cc.**).

Oil of Sandalwood 4, Tragacanth, in powder 1. Mix, and add quickly Water to 128. Shake well. Aromatic water with syrup may be used.

Mistura Santali Composita. *Syn.* NISBET'S SPECIFIC.

(This name may be used for a preparation of the following composition **without rendering it liable to stamp duty, providing this book and the page** be mentioned on the label.)

Dose.—½ to 1 drachm in water or milk thrice daily.

Santal Oil 12½ drachms, Cassia Oil 1½ drachms, Pimento Oil 40 minims, Alcohol (90%) 3½ ounces.

Capsules of Nisbet's Specific are prepared containing the Oils of ½ drachm dose of the above in 20-minim capsules.

Liquor Santali cum Buchu et Cubeba.

Dose.—1 to 2 drachms (**4 to 8 Cc.**) well diluted.

Yellow Santal Wood in powder 4, Buchu in powder 1, Cubebs in powder 1, Alcohol (60%) *q.s.* to moisten. Macerate 2 days and percolate with more alcohol and press to obtain 20.

Liquor Santali Compositus, *Martindale.*

Dose.—1 to 2 drachms (**4 to 8 Cc.**) diluted. Mix 2 volumes of Soluble Copaiba with 1 of the last preparation. A thick Liquor which can be almost cleared by adding 4% Potash Solution (1 in 2).

Liquor Santal cum Kava.

Dose.—1 to 2 drachms (**4 to 8 Cc.**) diluted.

Yellow Santal Wood in powder 4, Alcohol 60% *q.s.* to 15, Liquid Extract of Kava-kava 5. Is used in gonorrhœa, and is said to suppress the *ardor urinæ* and tendency to chordee, to increase the output of urine and to reduce pus.

Gelatin Capsules of Santal Oil and Kava Extract are prepared. *Dose.*—2 capsules 3 or 4 times a day.

✱**Blenosan** (T.M. 334680) is also a Santal and Kava preparation. Kava-kava in these preparations is thought to act as an anaesthetic to the urethral mucous membrane, to reduce congestion and is at the same time an anaphrodisiac.

Copaiba, the Oleo-Resin. *Syn.* BALSAMUM COPAIVÆ. In numerous Pharmacopœias.

Dose.—½ to 1 drachm (2 to 4 Cc.).

Is obtained from the trunk of *Copaifera Lansdorfii* and other species (*Leguminosæ*), imported from the coast of South America.

Soluble almost completely 1 in 1 of Alcohol 90%, almost entirely in Absolute Alcohol, Ether, and in four times its volume of Petroleum Ether. That known as Para Copaiba is transparent, yellowish and thinner than the Maracaibo variety, which is brownish and somewhat fluorescent. Sp. Gr. about 0·975 to 0·995 (*B.P.* '14).

Uses.—Diuretic and stimulant to mucous membranes, chiefly used for urethral diseases, and occasionally for chronic bronchitis. May produce a red rash. Given emulsified with mucilage or saponified, but best in Capsule. *See* also Liquor Copaibæ.

Capsules of Copaiba contain 5, 10, and 15 minims; capsules of **Copaiba and Santal Oil** of each 5 minims; also **Oil of Cubebs and Santal Oil** of each 5 minims also **Copaiba and Cubeb Oil** of each 10 minims. and of each 5 minims.

Oleum Copaibæ (*B.P.* '14).

Dose.—5 to 20 minims (0·3 to 1·2 Cc.). This is distilled from, and constitutes at least 45% of the oleo-resin. Sp. Gr. 0·896 to 0·910 Soluble in its own volume of Absolute Alcohol (distinguishes 'African'), about 1 in 20 Alcohol 90%.

Oil of Turpentine has also been used as adulterant—it is recognisable in a distillate.

1 Cc. of the oil dissolved in 5 Cc. of glacial acetic acid, and 4 drops of nitric acid added, should not develop more than a faint violent colouration (absence of gurjun oil).

Gonococcal arthritis treated by full doses of the oil, also by rubbing into the affected joints and fibrous tissue a mixture of Copaiba Oil 3, Olive Oil 1. —B.M.J. ii./11,1466.

Gonorrhœa treated by 15 minim doses at first thrice and then six times per diem with distinct effect on the discharge especially with the larger dosage —R. Stockman, B.M.J. ii./15,128.

Copaiba Resin is the residue left after distilling off the volatile oil from Copaiba. R. Stockman proved that this resin is *practically inert* as a genito-urinary antiseptic. Doses of 15 to 30 grains were given in gonorrhœa thrice daily.

Haustus Copaibæ, St. Barts'. H. Copaiba 15 minims, Solution of Potash 5 minims, Spirit of Nitrous Ether 15 minims, Mucilage of Gum Acacia 60 minims, Camphor Water to 1 ounce.

Liquor Copaibæ, Soluble Copaiba.

Dose.—½ to 1 drachm well diluted.

Copaiba 18, Solution of Potash 26. Boil for 15 minutes, dilute whilst hot with 10 of water, transfer to a bottle and set aside to clarify; then syphon off the clear liquor from the supernatant oily portion and the sediment. Make volume of same 36 with water.

Flavoring.—Glyl Lavandulæ, Glyl Pini; Extractum Glycyrrhizæ Liquidum, Syrupus Zingiberis.

Mistura Copaibæ, St. M.'s H.

Copaiba 15 minims, Mucilage 1 drachm, Magnesium Sulphate ½ drachm, Cinnamon Water to 1 ounce.

Liquor Copaibæ cum Buchu et Cubeba.

Dose.—1 to 2 drachms (**4 to 8 Cc.**) well diluted.

Buchu in powder 5, Cubebs in powder 2, Alcohol (60%) *q.s.* Percolate and press to obtain 14. Mix 1 part with 2 of Soluble Copaiba.

Flavoring.—*See* Liquor Copaibæ.

P1 OPIUM.

Syn. **Humbergum, Tabaiaco. Succus Papaveris Somniferi Capsulæ Inspissatus.**

(*The latter or the contraction*—**Succ. Papav. Inspiss.** *may be used in prescriptions to denote Opium where it is desired to refrain from using this name.*) **Pulv. Succ. Papav.** *will denote Powdered Opium.* (9·5 to 10·5% *Morphine.*)

P1 '*Opium and all preparations or admixtures containing* 0·2 *or more per cent. of morphine.*' (*Altered January* 3. 1921).

D *Medicinal Opium* '*of the requirements of the B.P.*' (*according to the* 1925 *D.D.A.* '*mixed or not mixed with neutral substances*'), *preparations and any substance containing one-fifth per cent.* (*one part in five hundred*) *or more of anhydrous morphine.* RAW OPIUM *includes powdered or granulated, but not medicinal, Opium.—See also Morphine and Diamorphine.*

Dose.—½ to 2 grains (**0·03 to 0·12 Gm.**).

FR. CX.—*Max. single dose* 3 grains ; max. during 24 hours 9 grains.

Antidotes.—*See* Morphine.

The inspissated juice obtained by incision of the capsules of *Papaver somniferum* (*Papaveraceæ*) from any geographical source. The Turkey product is best suited for pharmacy. Persian and Indian contain a large proportion of Narcotine.

Papaveris Capsulæ, Poppy Capsules. (B.P. '98).

Ⓟ "*Poppies, all preparations of, excepting red poppy petals and syrup of red poppies* (*Papaver rhœas*)." *Note.*—Fleurs de Coquelicot in France = Poppy Petals.

In the dried condition the capsules are used to prepare

Ⓟ **Decoctum Papaveris** 1 in 10. This is employed as fomentation in neuralgia, peri-dental abscesses and gum-boils.

Ⓟ **Decoctum Papaveris et Anthemidis.** Poppy Capsules 10, Chamomile Flowers 5, Water *q.s.*, boiled 10 minutes to produce 100. Employed as the last mentioned.

Poppy Extracts.—Extraction with ***Isopropyl Alcohol*** is suitable.—C. T. Bennett and D. C. Garratt, P.J. ii./26,149.

For galenical preparations, **Opium** *B.P.* '14 must contain when dried and powdered, between 9·5% and 10·5% of anhydrous morphine. Opium FR. CX. must contain 10 to 11% on the drug dried at 60° C. F.I. requires 10%. For the Tincture and Extract (*B.P.* '14), may be used if containing when dry not less than 7·5%, these preparations being standardised when prepared.

D P1 Opium P. JAP. IV. assayed according to the directions works out as 10.12 to 11·12% Anhydrous Morphine.

For Assay Methods, See Vol. II.

D P1 Opium. U.S. X. in its normal moist condition contains not less than 9·5% Anhydrous Morphine. **Granulated** and **Powdered Opium,** U.S. both contain 10 to 10·5% Anhydrous Morphine.

It is difficult to understand why the U.S. specifies *P. Somniferum* and its variety *album* as it would be impossible to say whether either had been used. —E. M. Holmes, P.J. ii./16,485.

INVESTIGATIONS ON INDIAN OPIUM. The terminal, or oldest, poppy capsules produce Opium of higher Morphine content than the lateral ones. Influence of manures. Indian Opium can be produced containing 20% Morphine, as rich, therefore, as Turkey Opium.—H. E. Annett, P.J. i./22,192.

A COMPARISON OF INTERNATIONAL PREPARATIONS of Opium with special reference to the International Agreement of 1906.—H. B. Stevens, B.P. Conf., 1923; P.J. ii./23,110.

Incompatible with Vegetable Astringents, Alkaline Carbonates, Salts of Mercury, Iron, Lead and Zinc.

Uses.—The oldest and most certain remedy for pain, also tends to check inflammation and relieve nervous diseases; lessens cough, arrests diarrhœa and dysentry (but is not advised for cholera). Externally the liniment is used for rheumatism, neuralgia and sciatica and is added to fomentations, and the ointment is applied to piles and fissures of the anus. Has some power in controlling the amount of sugar in diabetes. Children are very susceptible to its action.

It relieves the pain in appendicitis but must not be given for this, as, apart from the danger of the symptoms being masked, opium may paralyse the intestines and cause tympanites.

In CHOLERA even if a certain natural immunity exists it is immediately abolished directly the peristalsis is interfered with by Opium.

SEDATIVE EFFECTS.—A great actress faced the ordeal of the first night by means of 7 drops of Laudanum. John Hunter who disliked public speaking nerved himself for lecturing with 30 drops. The procedure may, however, bring about failure or lead to Opium habit.

De Quincy took 9 ounces of Laudanum a day (*circa* 300 grains of Opium). Two cases are on record in which 16 ounces per diem were taken,—these lived to advanced age. 'Speech' fright and stage fright are well treated by small doses of Opium just before the effort has to be made, *e.g.*, ¼ grain or 6 to 10 minims of Vinum Opii just before going into an examination, or a first appearance on the stage. Some advise a little Cannabis in addition.

Opium is stimulating to nerves, brain, &c., as well as being sedative,—in this respect it is stronger than Morphine. The stimulating effect is best obtained by small frequent doses.—B.M.J. ii./09,1606.

Given as hypnotic and not to relieve pain. Opium should be taken 2 to 3 hours before bedtime.—*ibid.*

ULCERATIVE STOMATITIS, common amongst ill-fed children, well treated by 2 to 5 drops of Laudanum twice daily.—*ibid.*

GANGRENOUS VARICELLA in year-old child cured by Iodoform dressing and 1 minim of Laudanum every 4 hours.—*ibid.*

Quiets nervous irritability, and gives a welcome spur to jaded nerves. For infants dose is ¼ minim of Laudanum for every three months of life. Can be repeated every 6 hours. With care no danger of undesirable consequences.—*ibid.*

PERITONITIS from perforation of stomach or bowels. Where surgical treatment is undesirable Opium nay be safely resorted to. In peritonitis there is marked tolerance to Opium even by infants.—*ibid.*

LOOSENESS OF BOWELS well treated by Laudanum. In colitis where tenesmus is distressing, and stools contain blood and mucus supplement dose by mouth by rectal injections (2 to 5 minims for a child) with a few grains of powdered Ipecacuanha in ½ oz. of thin boiled starch.—*ibid.*

In ACUTE PNEUMONIA its use may be attended with risk. In uræmic convulsions may be useful. To test truthfulness of statement of Morphine maniacs who have undertaken to cure themselves, the **Urine should be examined for Morphine.** At the end of 8 days from the beginning of abstinence the drug should have passed completely from the system.—*ibid.*

MELANCHOLIA—the mental pain of—treated by tonics, and in addition 5 minims of Laudanum thrice daily given without patient's knowledge, rapidly increasing until definite result.—B.M.J. i./11,804.

Pruritus Vulvæ in a severe case, 1 grain doses in pill was the only drug giving relief.—B.M.J. i./12,472.

Sciatica.—Opium Extract ½ grain with Valerian in a mixture every 2 hours or Opium Extract ½ grain with or without Cocaine Hydrochloride ⅓ grain in suppository.

If the Opium Extract (½ grain) be combined with Belladonna Extract ⅓ grain in the suppository, constipation will be prevented.

Abuse of Opium, Morphine, and Cocaine.

Opium Conferences under the League of Nations at Geneva.—Suppression of export trade in Opium for smoking takes effect within 15 years after the League is satisfied the smuggling has been effectively stopped. U.S.A. and China stood out.—B.M.J., i./25,321,419; P.J., i. /25,200. The Convention of February 1925, is not yet in force. Only the British Empire (excluding Canada and the Irish Free State), the Sudan, and Portugal, deposited their ratifications. A number of countries stand out. The position is highly unsatisfactory.—B.M.J., ii./26,1066.

China went back on her undertaking to extinguish Opium production within her borders and is raising thousands of tons of Opium yearly. Indian Government criticised for continuing to export large quantities.—B.M.J., ii./24,678.

The efforts of the Advisory Committee and the League of Nations have not been so successful as was originally hoped in combating illicit traffic in dangerous drugs.—B.M.J. i./27,804.

British Govt. Report for 1926 to the League of Nations on Opium and other Dangerous Drugs Traffic. A certain amount of smuggling goes on.—B.M.J., ii./27,184.

Opium Consumption.—450 mgr. per head per annum might be considered a provisional maximum amount of Raw Opium (containing an average of 10% Morphine) for the medical and scientific requirements of countries possessing a well-developed Medical Service.—L. i./24,720.

For reports of previous Conferences see Edition XVIII., pp. 627-8.

Smoking Opium.—An illustrated account.—Prof. Greenish, P.J. i./16,517.

In Formosa an Opium smoker must have a licence from the Japanese Government. It is difficult if he reforms to induce the police to receive back the ticket.—G. Gushue-Taylor, B.M.J. ii./21,1010.

100 Gm. of Opium in smoking yields HCN 0·01 Gm., Pyridine 0·147 Gm., NH_3 0·395 Gm., Morphine 0·016 Gm.—no Carbon Monoxide.—*Cf.* the figures in respect of Tobacco, p. 873.—W. E. Dixon, B.M.J. ii./21,819.

The drug addict is a product of modern civilization, and addiction is a symptom of a diseased mind; he is often a psychopath first. Description of Opium smoking; the Morphine in 10 pipes is only about ½ grain and 99% of this is destroyed in combustion. These addicts should not be regarded as criminals—they are mental cases. The Harrison Narcotic Law has proved a failure in the U.S.A. The legal cure in this country, on parallel lines, may be worse than the disease.—Prof. W. E. Dixon, B.M.J. i./23,544 (see also abstract under Cocaine).

Prof. Dixon's statements re Opium smoking strongly criticised. To say that the Opium smoker does not form a strong craving, and that he is easily cured, is simply not true. An Opium smoker passes through his cure with intense misery, especially manifesting itself in diarrhœa. The craving is intense.—J. Preston Maxwell, B.M.J. i./23,1076.

In the industrial centres of India there is a growing addiction to the use of 'Government Monopoly Opium,' the quantity consumed per 10,000 of population being 88 lbs. in Bombay, 216 lbs. in Rangoon, and 288 lbs. in Calcutta. Doping of children, by mothers working in cotton mills, unduly prevalent.—Review of the 'Opium Evil in India,' by C. F. Andrews, B.M.J., i./26,495.

Indian Hemp in India does not get the same hold on addicts as opium. There is much smuggling of Morphine by ships' crews. Morphine is abused by hundreds of thousands.—"Drug smuggling and taking in India and Burma."—Roy K. Anderson, B.M.J. ii./22,645.

Over £1,000,000 worth of drugs seized in New York during year ending June, 1923; most of it Heroin.—P.J. i./23,549.

The number of drug addicts in New York City was reported in 1918 to be 1·8% of the population.—P.J., i./26,543.

Opiate Addiction.—E. Huntington Williams has written a book upon this subject (MacMillan 1922). It is almost completely from the American standpoint, and deals with the use of narcotics and their "**Withdrawal**" and "**Gradual Reduction.**"

In treatment by withdrawal from a person taking Morphine or Heroin, the peculiarity is that the affections so produced—uneasiness and nervousness, followed by yawning, sneezing, watering of the eyes, excessive mucous secretion, extremities becoming cold and clammy sweatings—are relieved almost instantly by even a minute dose of the narcotic. While it is theoretically impossible for the addict to obtain his narcotic without the knowledge of the Federal authorities, in point of fact he is able to obtain the drug clandestinely almost everywhere in the U.S.A., the amount of his purchases being limited only by the capacity of his pocket.

In opiate addiction successful treatment lies in the administration of a non-habit-forming Opium derivative, *e.g.* Codeine or Ethyl-Morphine. The gradual reduction treatment does not permit the sole use of the Hyoscine class, as large doses of these alkaloids have to be given, in fact, if his sufferings are to be relieved, the patient must be made quite 'groggy,' by means of either Hyoscine or Atropine.

In some patients, who are addicted to hypodermic medication, it is worth while changing the method of treatment to one *per os*, but it should be noted that about 25% more of the medicament is required by this latter method. An important point is the giving of the same *quantities of solutions* either hypodermically or orally, the patient naturally associating a smaller quantity of diluent with an attenuated supply of drug.

The following appears to be the usual procedure in the Gradual Reduction Treatment in the U.S.A., and usually lasts about two months:—

During the first 20 *days* the amount of Morphine hypodermically is decreased gradually, and the decrease made up either by giving the deficit, plus 25%, by the mouth, or by exactly replacing the amount of Morphine stopped with Codeine Sulphate. A gradually increasing dose of Strychnine, either with the injection or *per os* should be given.

The next 6 *to* 12 *days* should see the Codeine entirely replace the Morphine hypodermically, the Strychnine as previously, should be given and the Morphine *per os* should be gradually diminished, though, of course, the volumes of all solutions given must remain the same. The daily amount of Codeine must now be lessened, a period of about 10 to 20 days being occupied (according to the honesty and disposition of the patient) in reducing the amount to zero. During these last stages, a bitter tonic should be given and a daily dose of Hyoscine Hydrobromide of 1/50th of a grain is required.

Acidosis should be treated with Milk of Magnesia, and Cascara is useful for the frequently attendant constipation.

It is interesting to know that some American States, *e.g.* California, fix the rate of reduction of drug from an addict at 1 grain of Morphine or ½ grain of Heroin weekly.

The Lambert-Towns Rapid Withdrawal Method is an extraordinary one, in which enormous quantities of Blue Pill are given, together with decreasing amounts of Morphine and increasing quantities of Belladonna, Xanthoxylum and Hyoscyamus Mixture. *v.*, p. 226. The treatment appears to culminate in the administration of 2 ounces of Castor Oil, the nervousness of the patient being controlled with Codeine!

The Pettey Method (George E. Pettey) includes the administration of Scopolamine in 1/200th grain doses, Sparteine Sulphate in 2 grain doses and Sodium Thiosulphate in doses of 20 grains, every 2 hours for 24 hours. Cathartic capsules, containing Calomel, Cascara, Ipecacuanha, Strychnine and Atropine are also given.

In these more rapid methods Dionin is stated to be more efficacious than Codeine; as it is about twice as powerful, it is argued that half the dosage will suffice. This is taken advantage of in

Sceleth's Method, in which Ethyl-Morphine Hydrochloride ½ grain is combined with Scopolamine, Pilocarpine and Cascara, and an amount varying with the amount of Morphine taken is administered daily for 10 days. Then Strychnine 1/30th grain, three times a day for 1 day, and on the following day the dose is halved and continued for a week. In about 4% of the cases Scopolamine delirium has been observed. In such cases it should be omitted for a few doses.

Hyoscine and Pilocarpine constitute the bases of **Bishop's Method**, with sometimes the addition of Heroin during the active stage.

For further on Drug Addiction, see Cocaine, Heroin, Morphine, Nicotine.

$\boxed{\mathfrak{P}1}$ **Emplastrum Opii** (B.P. 1898). 1 in 10 of Resin Plaster.

Opium locally, it is stated, has no effect.—B.M.J. ii./09,329.

Fr. Cx., Opium Extract 1, Elemi 1, Diachylon Plaster (Fr. Cx.) 2.

$\boxed{\mathfrak{D}}$ $\boxed{\mathfrak{P}1}$ **Extractum Opii (Siccum)** (*B.P.* '14) is now powdered. P. Austr., Helv., Belg., Hung., P.G. VI. Ph. Ned. V. Foreign Synonym—Extractum Tabaiaco (Thebaicum).

Dose.—¼ to 1 grain (**0·016 to 0·06 Gm.**).

An aqueous extract standardised to 20% of morphine.—F.I. adopts.

Fr. Cx. has the same with maximum single dose 1½ grains, maximum in 24 hours 5 grains approximately.

$\boxed{\mathfrak{D}}$ $\boxed{\mathfrak{P}1}$ **P. Jap.** IV. has approx. 16·87 to 18·54% morphine.

$\boxed{\mathfrak{D}}$ $\boxed{\mathfrak{P}1}$ **Extractum Opii Liquidum** (*B.P.* 14).

Dose.—5 to 30 minims (**0·3 to 2 Cc.**).

Extract of Opium 0·75, Distilled Water 16, Alcohol (90%) 4. Is of same strength as Tincture of Opium (B.P. '98), containing 0·75% of morphine.

$\boxed{\mathfrak{D}}$$\boxed{\mathfrak{P}1}$ ✱ **Liquor Opii Sedativus.** (*Battley* T.M. 12765). *Dose.*—5 to 10 minims. (**0·3 to 0·6 Cc.**) A proprietary hypnotic and sedative. It contains 1·8% Morphine, so that 1 drachm contains 1 grain of Morphine.—B.M.J. ii./26,764.

Origin of and details of composition of a preparation intended to resemble the latter.—P.J ii./14,136,213.

ⓟ**Linctus Opiatus C. X.**

Liquid Extract of Opium 2 minims, Oxymel of Squill 20 minims, Dilute Sulphuric Acid 5 minims, Treacle 20 minims, Water to 1 drachm.

ⓟ**Linctus Scillæ St. M.'s H.**

Oxymel of Squill ½ drachm, Compound Tincture of Camphor 15 minims, Honey to 1 drachm.

ⓟ**Linctus Scillæ Opiatus.**—*Syn.* **Linctus Camphoræ Compositus, St. Bart's., L. H., St. G. H., Gee's Cough Linctus, E.L., Linctus Scillæ Compositus E.G.A.**

Dose.—1 drachm (**3·5 Cc.**).

Paregoric, Oxymel of Squill, and Syrup of Tolu, equal parts.

ⓟ**Linctus Tolutanus cum Opio.** **Brompton H.** uses Syrup of Squill *vice* Oxymel in latter.

$\boxed{\mathfrak{P}1}$**Linimentum Opii** (*B.P.* '14). (*Exempted from* $\boxed{\mathfrak{D}}$).

Tincture of Opium 1, Liniment of Soap 1; filter after a few days. A commonly used anodyne for pain.

ⓟ**Mistura Sodæ cum Opio, St. M.'s H.**

Liquid Extract of Opium 3 minims, dilute Hydrocyanic Acid 2 minims, Sodium Bicarbonate 6 grains, Water to 1 ounce.

$\boxed{\mathfrak{P}1}$**Pulvis Cretæ Aromaticus cum Opio** (*B.P.* '14). (*Exempted from* $\boxed{\mathfrak{D}}$).

Dose.—10 to 60 grains (**0·6 to 4 Gm.**).

Contains Opium 1 with 39 of Pulvis Cretæ Aromaticus, which has *dose* 10 to 60 grains (**0·6 to 4·0 Gm.**). The latter was the old "Aromatic Confection." ⓟTablets each 5 grains (**0·3 Gm.**).

🄳 🄿1 **Pulvis Opii Compositus** (*B.P.* '14).

Dose.—5 to 15 grains (**0·3 to 1 Gm.**).

Opium 10, Black Pepper 15, Ginger 30, Caraway Fruit 42, Tragacanth 3 Contains 1 of Opium in 10.

Note.—🄳 🄿1 *Pulvis Opii Compositus* Ph. Ned. V. is Dover's Powder (*B.P.* '14), and has Dover's Powder as Synonym.

🄳 🄿1 Tablets of Opium ½ and 1 grain.

Ⓟ **Tinctura Camphoræ Composita.**—*Syn.* PAREGORIC (*B.P.* '14). Is known on the Continent as **Tinctura Opii Benzoica.** *Syn.* FR. CX. 'ELIXIR PAREGORIQUE.' *Dose.*—½ to 1 drachm (**2 to 4 Cc.**).

Tincture of Opium 50, Benzoic Acid 5, Camphor 3, Oil of Anise 3, and Alcohol (60%) to 1000. F.I. requires 0·05% Morphine. *B.P.* '14 approximates this. FR. CX. has this strength.

Ⓟ P.G. VI. and **Ph. Ned. V.** have 0·05% Morphine, but amounts of other ingredients varied. Ⓟ **P. Jap.** has 1 of Opium in 200.

Tinct. Camph. Co. of the Portuguese Pharmacopœia is a liniment containing 20 times as much Opium as the British tincture.—C. Rousseau, B.P. Conf. 1923.

Flavoring.—Syl Coriandri, Glyl Pini; Elixir Aromaticus.

Ⓟ **Tinctura Opii Camphorata, U.S.**

Average dose.—1 drachm.

Similar in composition. 1 of Powdered Opium in 250.

The presence or otherwise of Morphine may be detected and indeed compared with a Standard Paregoric by working on as small an amount as 2·5 Cc. of a specimen. The details of the method must be carefully adhered to.—Bird, P.J. ii./05,155.

Ⓟ **Syrupus Camphoræ Compositus, Bristol Infirmary** (revised).

Dose.—1 drachm (=laudanum ¾ minim approx.) occasionally.

Benzoic Acid 45 grains, Glacial Acetic Acid 7 drachms 20 minims, Vinegar of Squill and of Ipecacuanha each 10 ounces, Anise Oil 30 minims, Camphor 30 grains, Opium Tincture 2 ounces, 5 dr. 20 minims, Sugar 7 lbs., Caramel *q.s.*, Water to 1 gallon. Pharm. Form. advises at least 2½ ounces of Spirit to dissolve the oil, Camphor and Benzoic Acid. Mix the solution with the Laudanum and add to the cold syrup with stirring, then the colour.

🄳 🄿1 **Tinctura Opii**—*Syn.* LAUDANUM (*B.P.* '14). *Syn.* TINCTURA THEBAICA.

Dose.—20 to 30 minims (**1·2 to 2 Cc.**), or 5 to 15 minims (**0·3 to 1 Cc.**), repeated.

Contains 1% (B.P. '98 was 0·75%) of anhydrous Morphine.

🄳 🄿1 **U.S.** X. has 1 of Granulated Opium (10 to 10·5% Anhydrous Morphine) in 10 of Alcohol and Water Mixture (Final Alcohol content 17 to 19% by volume). Fat in the opium is removed by hard Paraffin. The preparation replaces **Tinctura Opii Deodorati** of U.S. IX.—*cf.* Edn. XVIII, p. 632. **Ph. Ned., P. Hung.** and **P. Belg.** contain 1% Morphine, made with 70% Alcohol. FR. CX. dissolves 1 Gm. Opium Extract in 19 Gm. Alcohol 70% to produce the same strength.—*Maximum single dose* 35 minims, and during 24 hours 110 minims approximately. We found Sp. Gr. of this to be 0·902. F.I. requires 10% strength by percolation with Alcohol 70% and to contain 1% Morphine. *B.P.* '14 approximates this.

It is desirable to mix the dried Opium in coarse powder with twice its weight of washed and dried sand and to percolate with Spirit without macerating first of all. Conducted in this way the Opium will not 'block,' similarly also in the case of Tinctura Opii Crocata —P.J. ii./09,2.

Suggestions to revert to Redwood's process of 1885 with the addition of

percolation, also revision of process for estimation of Opium.—A. C. Abraham and Co-Workers, P.J. i./22,356.

In support of the B.P. '14 method of making Tincture of Opium, and the B.P. '14 process of Opium assay—remarks on A. C. Abraham's and P. A. W. Self's papers.—D. B. Dott, P.J. ii./22,22,205. See also pp. 128, 205, 231, 260.

For further remarks on estimation see Vol. II.

Flavoring.—Syl Menthæ Piperitæ, Syl Rosæ.

Uses.—*See* Opium.

D P1 **Tablets** = Tincture of Opium 5 and 10 minims are prepared, weighing 2½ and 4½ grains.

D P1 ✱ **Nepenthe** (T.M. 464) (or ANODYNE TINCTURE) is similar and is given in dose as Tinctura Opii (*B.P.* '14). Incompatible with alkalis. *It contains* 0·84% *Anhydrous Morphine.*

D P1 **Tinctura Opii Crocata.** SYDENHAM'S LAUDANUM.

Dose.—5 to 20 minims (**0·3 to 1·2 Cc.**).

F.I. requires 1% Morphine. FR. CX. Supp. 1920.—Opium 110, Saffron 50, Cinnamon Oil 1, Clove Oil 1, Alcohol 30% 920—all by weight (conforms with F.I.). Max. single dose, 2 Gm. (=30 minims), max. during 24 hours 6 Gm. (=90 minims) approx. Other continental formulæ, *e.g.*, P.G. VI. and Ph. Ned. V. approximate this.

D P1 **Vinum Opii Crocatum**, as used in Thieleman's Koleradraber (*q.v.*), in Norway, has the composition :—Opium Powder 15, Ceylon Cinnamon 1, Cloves 1, Saffron 5, Malaga Wine 150, *i.e.*, approximating the Tincture of P.G.

Ⓟ **Tinctura Opii Ammoniata** (*B.P.* '14).—*Syn.* SCOTCH PAREGORIC.

Dose.—½ to 1 drachm (**2 to 4 Cc.**).

Contains 0·1% Anhydrous Morphine. One ounce contains, quite approximately, ½ grain anhydrous morphine.

Ⓟ **Trochisci Opii B.P.** 1885.

Contained $\frac{1}{10}$ grain Extract of Opium in each, with liquorice.

Ⓟ **Trochisci Sedativi, T.H.**, contain the same quantity with fruit basis, and are marked 'S.'

D P1 **Unguentum Opii.** 1 of extract in 10 of Unguentum Cetacei.

P1 **Unguentum Gallæ cum Opio** (*B.P.* '14).

Contains 7·5% of Opium with Gall Ointment (Galls 1, Benzoated Lard 4). Exempted from D.

P1 **Collapsible Tubes** with rectal tube are for use in hæmorrhoids. Prof. Dixon says opium locally has no effect.—B.M.J. ii./09,329.

D P1 **Vinum Opii, B.P.** 1885.

Dose.—10 to 30 minims (**0·6 to 2 Cc.**).

Contained 1 of Extract in Sherry 20, with Aromatics.

D P1 **Opium Concentratum, P.G. VI.**

Max. single dose.—0·03 Gm. ; *pro die* 0·1 Gm.

The total alkaloids of Opium as hydrochlorides, containing 48 to 50% Morphine. Elaborate instructions are given for preparation.

D P1 **Hydrochlorates Alcaloideorum Principalium Opii, Ph. Ned. V.** *Syn.* **Opialum, Opial.**

Dose.—Max. per os per diem 3 grains (**0·2 Gm.**) : *hypodermically* 2 grains (**0·12 Gm.**).

Contains Narceine Hydrochloride 1, Thebaine Hydrochloride 2, Codeine Hydrochloride 2·5, Papaverine Hydrochloride 4, Narcotine

Hydrochloride 30, Morphine Hydrochloride 50, and Sodium Chloride 10·5%.

Sahli expressed the opinion that the ***combined alkaloids*** would be the most effective narcotic. The following are brands of the mixed Opium Alkaloidal Hydrochlorides in commerce.

𝔇 P1 * **Alopon** (T.M. 365294). *Dose.*—1/6 to 1/3 grain (**0·01 to 0·02 Gm.**) A light brown powder readily soluble in water. Gastric and intestinal sedative; also in nervous conditions and in diseases of the respiratory tract. Used as an analgesic and hypnotic prior to operation as an adjunct to general anæsthesia.

𝔇 P1 **Tablets**, Oral, 1/6 grain in each. *Dose.*—1 or 2 tablets, Hypodermic, 1/3 grain. *Solution*, 2 per cent. for Oral use. *Single Dose.*—15 to 30 minims, repeated 5 to 15 minims. *Glass Capsules* 1/3 grain in each also 1/3 grain combined with Atropine 1/150 grain and 2/3 grain with 1/150 grain Scopolamine.

𝔇 P1 * **Omnopon** (T.M. 317126) *Syn.* PANTOPON—*Dose per os*—1/6 to 1/3 grain (**0·01 to 0·02 Gm.**) thrice daily. *For max. dose cf. Ph. Ned. antea.*

A brown powder soluble in water. 1 Gm. of Omnopon is equivalent to 5 Gm. of 10% Opium.

Composition.—Morphine 52%, Narcotine 20%, Codeine 2%, Papaverine 2·5%, Thebaine 1%, Narceine 1·2%, other alkaloids 4%, Water 8%, Hydrochloric Acid 9%.—F. W. Watkin Thomas, Bio-Chem. Jl *Vol. VI.* part 4, 1912.

When used as an injection (Ampoules are made) 1 Cc. of 2% solution is injected 1 hour before operation, though the dose should preferably be subdivided and given at intervals, *e.g.*, ½ Cc. 1 hour prior to operation and another ½ Cc. just before, *i.e.*, as preliminary to Chloroform or Ether anaesthesia.—Anodyne action is striking.—L. ii./10,1169; L. i./11,368,673.

𝔇 P1 **Tablets** of 1/6 grain Omnopon each = 5/6 grain Opium (*B.P.* '14). For internal medication in suitable cases.

𝔇 P1 **Ampoules** contain 1·1 Cc. of 2% solution in 25% Glycerin and Water = 25 minims Opium Tincture B.P. 1898. 1 Cc. = ⅓ grain Omnopon.

Phthisical cough relieved. Especially useful in advanced cases (night sweats, etc.) where palliative treatment is alone possible. Control of hæmoptysis by 1/3 grain. Relieved pain in cancer cases and in gastric ulcer and useful in diarrhœa and intestinal catarrh. Used with advantage in the first stage of labour without diminishing force or duration of the uterine contractions. Dyspnœic attacks of bronchial asthma rapidly subside after 1/3 grain subcutaneously. Can be used in cases of chronic renal insufficiency in 1/3 grain doses for dyspnœa.—C. L. Williamson, and G. W. N. Joseph, M.P.C., Sept. 17'13.

Omnopon ⅔ grain **with Scopolamine** 1/150 grain is used as intra-muscular injection to subdue post operative pain May be followed by a second dose ½ the strength.—Said to be a safe narcotic.—L. ii./11,672,

For anæsthetic purposes deep intramuscular injection of 1 Cc. 1¼ to 1½ hours before operation, followed by a local anæsthetic, to infiltrate the tissues in the operation area. When ether is employed the amount required is greatly lessened.—H. M. W. Gray, L. Sept. 2,1911, and B.M.J., Aug. 22,1914. See also W. de C. Wheeler, Med. Press, Apl. 1,1914, also M. Ramsay on its use in ophthalmic surgery.—L. April 25 '14.

𝔇 P1 **Omnopon Atrinal.** A combination of Omnopon with an Atropine derivative. Ampoules contain 1·1 Cc.; each Cc. contains 0·02 Gm. (⅓ grain) of Omnopon with 0·001 Gm. (1/60 grain) of Atrinal. This latter substance has a corrective effect on the Morphine. Suggested where stimulation of the respiratory centre is indicated. In asthma, chronic emphysema and tachycardia, also in gastric ulcer, pyloric and intestinal spasm and the like and as an adjuvant to general anæsthesia.

𝔇 P1 * **Opoidine.** (T.M. 419166.) *Dose.*—Tablets contain 1/6 grain (0·01 Gm.). The total alkaloids of opium in a soluble form, one part being equivalent to 5 of opium. It contains about 50% Morphine. The Narcotine in the remainder is thought to 'potentiate' the Morphine (Straub). Hypnotic, sedative, analgesic and in other respects representing Opium.

Hypodermic Tablets and Ampoules contain ⅓ grain (0·02 Gm.).

There is less danger of toxic effects than from Opium, as smaller quantities can be given.—B.M.J., ii./25,804.

OVULES VAGINALES.

Ovules are oviform vaginal pessaries prepared with Glycogelatin basis or with Theobroma Oil basis. They dissolve slowly and produce a continued action of the medicament on the parts in cases of leucorrhœa, also for ulceration and inflammation of the cervix uteri. Each Ovule weighs approximately 4 drachms (15 Gm.) The following are made:—

Alum, 10 grains (astringent).
Aristol, 5 to 10 grains (antiseptic).
Ⓟ Belladonna Extract, 1 grain (sedative).
Boric Acid, 15 grains (soothing).
Carbolic Acid, $\frac{1}{2}$ grain (antiseptic).
[𝔅] [P1] Cocaine Hydrochloride, $\frac{1}{4}$, $\frac{1}{2}$ and 1 grain (local anæsthetic).
[𝔅] [P1] Cocaine Hydrochloride, 1 grain with Adrenalin $\frac{1}{500}$ grain (anæsthetic and astringent).
Copper Oleate, 5 grains (in malignant disease).
Hamamelis, 10 minims of Liquid Extract (anti-hæmorrhagic).
Ichthosulphol, 5, 10 and 12½% (30 grains in each) (in ulceration, antiseptic and stimulant). Preferably made with Theobroma basis.
Ⓟ Ichthosulphol 5% with Belladonna Ext. 1 grain with Theobroma.
Iodine, 1 grain (astringent and antiseptic).
Iodoform, 5, 10 or 15 grains (antiseptic).
Iodol, 2 grains (antiseptic).
Ⓟ Morphine Hydrochloride, $\frac{1}{4}$ and [𝔅] [P1] $\frac{1}{2}$ grain (anodyne).
Ⓟ Opium, 1, 2 grains (sedative).
Quinine Hydrochloride, 3 grains (in leucorrhœa and to check conception).
Resorcin, 3 grains (antiseptic).
Suprarenal Extract, 5 minims (hæmostatic).
Tannic Acid, 8 grains (astringent). Made with Theobroma basis.

To be efficient these ovules must be inserted as far as possible whilst the patient is in the supine position with the hips raised. A sanitary towel may be worn. Most effectual at bedtime.

Gelatin Ovules for hot climates are made slightly harder.

Theobroma Ovule Mass for hot climates.

Suitable proportions of White Wax raise the Melting Point of Theobroma Oil. Our experiments using Theobroma Oil Melting Point 93° F. (before melting and on resolidifying 90·5° F.) and White Wax melting at 142° F., show the following:—

A mixture containing	2½%	White Wax	gives	M.Pt.,		90·5° F.
,,	,,	4 % and 5%	,,	,,	,,	,,	91·5° F.
,,	,,	10%	,,	,,	,,	,,	103° F.
,,	,,	15%	,,	,,	,,	,,	115° F.
,,	,,	20%	,,	,,	,,	,,	122° F.

On the whole we consider the 15% addition of Wax the best—it melts in contact with the mucous membrane. See also **Suppositories**.

OXYGENIUM.

OXYGÈNE Fr. Cx. O=16.

Oxygen is obtained commercially by the rectification of liquid air by a process of fractional liquefaction. It is available so made of not less than 98·5% purity. For detailed description of the apparatus used see Thorpe. The Barium Oxide process is not used now.

Liquid air as a source of Oxygen, *e.g.*, for aviators at high altitudes—can be obtained up to 80% pure.—B.M.J. ii./19,77.

Sodium Peroxide (Oxylith) has been used for generating oxygen in Metal generators by the gradual addition of water but our experience is that the method is not suitable for therapeutic purposes—much heat is evolved, strongly alkaline vapour and spray are liable to be carried over and the method is hardly one which can be trusted to a nurse or layman.

Oxygen made from this, thought to be more active than 'Chlorine' Oxygen or dead oxygen in a cylinder.—H. A. Ellis, L. i./20,569.

It is sold compressed in **Cylinders** containing the equivalent of 20 cubic feet (560 litres approximately) at normal temperature and pressure and upwards for inhalation from an **Inhalation Bag.** By the aid of this, the oxygen may, if desired, be mixed with air as it is administered to the patient, or the gas may be passed direct into the patient's mouth by a glass tube or from a funnel which is suspended above the face (the latter method is probably of little use—*vide infra*).

Sp. Gr. 1·10527 (Air=1). It is therefore slightly heavier than air, 1 litre weighs 1·429 Gm. at 0° C. and 760° m.m. pressure. At 20° C. and under normal pressure 1 litre of water dissolves 28 Cc. of oxygen.

Ozone. $O_3=48$.

Is known as active or tri-atomic oxygen. It is a very powerful oxidising agent, the third atom of oxygen in the molecule being in the labile condition.

The effect of passing electrical currents through oxygen is to produce ozone which may be recognised by the peculiar odour. When in large quantity it is irritating to the air passages, giving rise to cough and also producing headache. Mildly ozonised air has been inhaled for phthisis and the spasmodic stage of whooping cough.

It has been suggested that inhalation of Ozone is injurious to the respiratory tract rather than beneficial in warding off injurious diseases, but this is exaggerated. Experience in the Central London Railway and elsewhere proves the contrary. There is no doubt that Ozone does not only mask bad smells but destroys them.—Ozonair Ltd.

Dysentery treated by Ozone after Ipecacuanha and Opium failed to keep it in check. Ozone has a powerful action on cholera and typhoid organisms. The lower intestine was gently washed out from time to time with ozonised water and ozonised water was freely drunk by the patient while the Ipecacuanha and Emetine was continued. The air of the sick-room was also kept slightly ozonised. The result was a cure.—F. M. Lessing, L. ii./13,1255.

Surgical use of Ozone. Sinuses healed.—G. Stoker, L. i./17,797.

Uses of Oxygen.—

Warm the gas by discharging it into a rubber gas bag and keeping in same for an hour or two if possible prior to use. Open the cylinder in an adjoining room so as not to alarm the patient.

A **hot water box** may contain a spiral metal tube through which the Oxygen passes to the patient from the bag. **A Woulf's Bottle** containing hot water is also useful—the gas being bubbled through it.

Inhalation of oxygen is of great service in pneumonia, bronchitis, asthma, angina; it relieves dyspnœa, and reduces temperature. May be used after chloroform to accelerate recovery. It is the best cardiac and respiratory stimulant. Severe cases of whooping cough have been treated—give just before onset if possible. Vomiting of phthisis.—A few whiffs of Oxygen are stated to be effective in preventing the severe form of cough in phthisis which usually ends in vomiting. It is a successful antidote to morphine, opium, strychnine, cyanide, and carbon monoxide poisoning; for resuscitation after partial drowning, and threatened death from inhalation of nitrous oxide.

Intranasal Method is advised.—G. Bourne, Pr. Jan., '24,43.

In hæmorrhage, anæmia, etc., of doubtful use. Airs of more than 60% of Oxygen may produce pulmonary inflammation. Oxygen-enriched airs are of life-saving value in PULMONARY OBSTRUCTION, ŒDEMA, or other deficiencies retarding Oxygen absorption or preventing full saturation of the hæmoglobin of the pulmonary blood. Must be used with care.—C. W. Greene, Jl. A.M.A., ii./25,645-650.

In congenital heart disease oxygen is of no avail; not indicated by cyanosis of cardiac origin, when lungs are comparatively clear. Chronic cyanosis of emphysema is temporarily relieved. Specially called for in acute PULMONARY FAILURE, together with inadequate ability for compensation by the heart and blood. Should be administered over hours or days.—Per Jl. A.M.A., ii./25,1430.

The Gilchrist and Davies Oxygen apparatus is described, and its use advocated, for the quantitative supply of Oxygen. Criteria of successful Oxygen administration are abolition of cyanosis, relief of dyspnœa, and—the most reliable—fall in pulse rate.—Oxygen Administration, H. W. Davies, B.M.A., 1927, B.M.J., ii./27,911.

Indications for Oxygen Therapy.—W. T. Richie, B.M.A., 1927, B.M.J., ii./27,915.

Injection of Oxygen.

Endovenous injection of 120 Cc. of oxygen slowly in the case of a patient *in extremis* has been practised. Sciatica has been treated by the hypodermic injection (deeply) of 250—400 Cc. of Oxygen.

In the dyspnœa of tuberculosis, gas poisoning, pneumonia, bronchial asthma, and operative cases oxygen has been *injected subcutaneously* until a lump the size of a closed fist is raised. The local emphysema is virtually an artificial lung lasting for hours; results remarkable—the body absorbing that which is necessary. Animal experiments suggest that Oxygen Injections should be made as a treatment for tetanus. The artificial oxygen emphysema is capable of rescuing men from incipient gangrene.—B.M.J. i./17,702.

Intraperitoneal injections have been made. Of value in tubercular diarrhœa, tubercular peritonitis and 'tabes mesenterica.'—R. S. Grewal, I.M.G., Sept. '25,421.

For poisoning by asphyxiating gas subcutaneous injection of oxygen advised—*vide* Poisons at end under Chlorine.

Tuberculous affections treated by inflation with Oxygen. Fluid is first aspirated from cavity.—E. Rost, B.M.J. ii./21,978.

Atmospheric Pollution.—Its causes and prevention. (See Vol. II.)

Leonard Hill's Oxygen Mask is of celluloid with a curtain of washable material and heating box for evaporating alcohol and adding vapour of alcohol to the oxygen. (The common idea that the processes of combustion in the body are accelerated by breathing oxygen is erroneous.)—B.M.J. i./12,71.

Haldane's Oxygen Apparatus for inhalation. Improved face piece and bag to attach to cylinder.—B.M.J. i./17,181; ii./19,65.

Pleurisy treated by injections of air.—B.M.J.E. ii./11,75.

A new outfit for administration.—L. i./25,916.

Oxygen and Alcohol Inhalation.—Sir W. H. Willcox advises as cardiac stimulant the use of Alcohol Vapour mixed with Oxygen. A wash-bottle is used, the Oxygen passing by the inlet tube in a rapid stream, dipping about half an inch or so below the surface of the contained Absolute Alcohol. At ordinary temperatures the Oxygen bubbled through the Alcohol would contain from 4 to 5% of Alcohol vapour (from 1 to 2 grains of Alcohol per litre). After from three to five minutes the full therapeutic effect is obtained, and lasts for several minutes. In severe cardiac failure the mixture of Oxygen and Alcohol vapour should be given for five minutes every half hour. The Alcohol vapour is absorbed by the lungs and carried direct to the heart. The method is pleasant and invigorating in pneumonia with cardiac failure, cases of heart failure following Chloroform and various surgical operations, angina pectoris, asthma with cardiac failure, septicæmia, typhoid fever, myocardial degeneration, dilatation of the heart, valvular lesions of the heart, collapse after epidemic diarrhœa, etc.—B.M.J. ii./10,1408 to 1411; ii./10,1562,1658.

Liquid Air.

Consists mainly of oxygen and nitrogen, and when freshly prepared is a nearly colourless liquid boiling at—190° C. As the more volatile Nitrogen evaporates the temperature rises and the liquid assumes a bluish tinge,—the colour of liquid oxygen. With the exception of oxygen and chlorine, which has a yellowish tinge, most gases are colourless in the liquid condition.

Uses.—Nævi have been treated with it.

For a description of Air liquefying apparatus, Vacuum Vessels, Thermos Flasks and Hydrogen liquefying apparatus see Vol. II.

Nitrogen. N=14·008. Nitrogen is a colourless, odourless, tasteless **gas** constituting about 77% by weight (79% by volume) of the atmosphere. Nitrogen prepared from the atmosphere contains a small amount of **Argon** *q.v.* 1 litre of Nitrogen weighs at 0° C. and 760 mm. pressure 1·25072 Gm. It is only slightly soluble in water. The Nitrogen group of elements includes Nitrogen, Phosphorus, Arsenic, Antimony, and Bismuth. These are in combination sometimes trivalent and at others pentavalent (Bismuth in its well characterised inorganic compounds is always trivalent—but in organic compounds also pentavalent).

The treatment of hæmoptysis in phthisis by **artificial Pneumothorax** consists in introducing Nitrogen between the two layers of the pleura through Saugman's or K. Peterson's needle (described), and thus inducing collapse of the lung. There is no chosen spot for the puncture,—it is commonly made in one of the axillary lines in the seventh or eighth intercostal spaces. The aim is to find a spot where the lung is healthiest and to avoid the neighbourhood of cavities. A hypodermic injection of Morphine is desirable ½ hour before the operation. A local anæsthetic such as Eucaine is also advisable. The quantity of Nitrogen or air injection is 200 to 300 Cc. Oxygen has also been suggested, but animal experiments were not in favour of its use.

Pneumothorax Apparatus. Many hundreds of Nitrogen injections have been made.—L. ii./11,145 *et seq.*; ii./13,1627; B.M.J. i./14,897.

Pulmonary tuberculosis treated by Nitrogen Compression three separate injections of 500 Cc.—G. Lucas, B.M.J. ii./15,211. See also L. ii./23,899.

Ordinary air used.—B.M.J.E. ii./26,15.

H. Batty Shaw recommends artificial pneumothorax in the early stages of consumption.—Pr. Feb. '24,107. *Further refs. previous Edns.*

Widespread impression that the treatment should be withheld until after trial of sanatorium methods, because of danger, to be deprecated. Of 394 cases only 2% died as the result of treatment.—R. C. Matson, L. i./25,790.

Some end-results in pneumothorax. Not a 'cure-all,' but nevertheless an advance in treatment.—S. V. Pearson, L. ii./25,1024; B.M.J. i./26,52.

Active Nitrogen.

The Hon. R. J. Strutt has shown that Nitrogen, under the influence of an electric discharge, assumes an active state in the same way possibly as Oxygen does in the form of Ozone. This active Nitrogen is reactive with Carbon Compounds.—L. i./13,1469.

PANCREAS.

In the pancreatic juice of man four distinct digestive ferments are believed to be contained.

Trypsin, a proteolytic ferment acting in an alkaline medium. Converts protein, albumen, *e.g.*, casein of milk and fibrin, into peptones ; **Amylase (Amylopsin) or Pancreatic Diastase** which converts starch into dextrin, maltose and dextrose ; **Lipase (Steapsin),** a lipolytic ferment (emulsifies fats), see also p. 763 ; and **a Milk-curdling Ferment Rennin,** converting casein into a form of peptone.

The idea that Rennin is present in the Pancreatic Juice is not held by many (vide Bainbridge and Menzies, 'Essentials of Physiology') who consider that Trypsin is the milk-curdling function. The presence of Rennin would seem to be unnecessary in view of the active milk-curdling property of the gastric juice.

For invalids, aged persons, and those suffering from weak digestion, or those prostrated by fever or exhaustion, preparations of the pancreas of the pig (an omnivorous animal) may be employed, by means of which food may be partially or wholly digested previous to administration ; their nutrition is thus maintained, and the stomach has time to regain its powers of digestion.

These preparations may also be given internally in cases of dyspepsia and defective nutrition.

The pancreas is sometimes called the 'sweetbread,' but the sweetbread known to cookery is the thymus gland of the sheep, and *not* the pancreas, which, being tough and stringy, is inferior in value to the sweetbread of the throat for cooking.—Ph.

The pancreas plays an important part in enabling the organism to resist infection, and the spleen is said to assist by producing a hormone which activates trypsinogen and raises the phagocytic index.

Mechanism of the pancreatic secretion.—J. Mellanby, L. ii./26,215.

Pancreatin in proved deficiency is the only enzyme preparation for which there is enthusiasm.—Jl. A.M.A. ii./25,744.

Diet in gout.—Pancreas and Thymus Sweetbreads are the foods richest in purins. They are frequently advised for invalids' diet. It would appear desirable to eliminate these foods.—L. i./13,1793.

DIABETES treated by raw pancreas *per os.*—T. J. Hollins, B.M.J., i./25,503.

Even to the mincing of the gland and giving it with lettuce, the method of Hollins (*antea*) was employed 30 years previously by R. Robertson Young. —B.M.J., i./25,632.

Value of raw fresh pancreas in diabetes *not* confirmed.—G. A. Harrison, B.M.J., i./25,760. *See also* R. D. Lawrence, B.M.J., i./25,1108.

SPRUE.—Raw pancreas—initial dose teaspoonful, increased to tablespoonful, of chopped mass including juice, once or twice daily, useful adjuvant.—A. Castellani, Jl. Trop. Med., June 15, '25,231.

Pancreatinum, U.S. X.

Dose.—2 to 4 grains (0·12 to 0·25 Gm.).

A cream-coloured amorphous powder, slowly and incompletely soluble in water ; insoluble in alcohol ; consisting principally of amylase, trypsin and lipase, obtained usually from the hog. It digests albuminoids and converts, if of U.S. Standard, not less than 25 times its weight of starch into soluble carbohydrate. Assay process is provided.

FR. CX. states it loses its activity on warming solutions of it above 50° C. Its peptonising action is best in neutral or very slightly alkaline or very slightly acid solution. The Assay process provides for conversion of 12½ times its weight of dried fibrin or 50 times its weight of fresh fibrin.

Pancreatin Tablets, 2½ grains, with Sodium Bicarbonate, are prepared. One is sufficient to peptonise half a pint of milk.

Liquor Pancreatis, Pancreatic Solution (*B.P.* '14).

Dose.—1 to 2 drachms (**4 to 8 Cc.**).

This solution contains the amylolytic, the proteolytic, and the milk peptonising properties of the pancreas, and is made by extraction of the fresh pancreas of the pig, freed from fat and external membrane.

Pancreatic Juice, obtained in its inactive form from the pancreatic duct, acquires powerful proteolytic activity by mixing with it a soluble calcium salt and incubation.

Test.—Should peptonise 27 times its volume of milk.

Incompatibility.—Broadly speaking we found that the following—Alum, Copper Sulphate, Ferric Chloride, Zinc Bromide, Zinc Sulphate and Syrup of Ferrous Iodide destroy the proteolytic action of the ferment. Acids generally are incompatible.

For details of inhibition of Amylolytic Activity, *see Vol. II.*, *cf.* also **Pepsin,** p. 662.

Uses and References.

Glycosuria.—In certain forms of severe glycosuria depending on excessive activity of the liver Pancreatic preparations are valuable.

Pancreatic juice is the digestive fluid *par excellence.* Many animals are void of a gastric digestion, but all have something corresponding to pancreatic juice. Dextrose, as far as experiments go, is the best tissue food. The internal secretion of the pancreas determines its utilisation by the organism.

Insulin *is dealt with at end of this chapter.*

In chronic pancreatitis, pancreatin in suitable intestinal medicament may be employed with advantage before the operation and also in cases unsuitable for operations.—Whitla.

It should be given as digestive *towards the end of the normal period of gastric digestions—about two or three hours after a meal.*

In SPRUE, pancreatin in 5 to 10 Gm doses with 20 to 40 Gm. Calcium Carbonate, three times a day 2 hours after food, has been given with success. The treatment is based on results of experiments, which showed complete absence of pancreatic ferment.—T. D. B. 18/21,50.

Glycerinum Pancreatis, *Martindale,* a digestive preparation made from the pig's fresh pancreas.

Dose.—1 to 2 drachms (**4 to 8 Cc.**).

Liquor Pancreaticus (✱Benger's : T.M. 321220).

Dose.—1 to 2 drachms (**4 to 8 Cc.**) in water with meals to aid intestinal digestion, or with farinaceous gruel, when cool enough to sip. As an addition to nutritive enemata, a dessertspoonful should be added to beef tea or milk gruel just before its administration. Will not keep diluted, and presence of acidity or heating over 140° F. destroys the ferment.

N.F. gives the following :—Triturate Pancreatin 128 grains, with Sodium Bicarbonate 6 drachms, and Water 10 ounces, add Alcohol ½ ounce, Compound Spirit of Cardamom N.F. ½ ounce, and Talc 120 grains. Shake well and filter, adding Water to 12 ounces, then Glycerin 4 ounces. Each drachm represents 1 grain of Pancreatin.

Spiritus Cardamomi Compositus. Compound Spirit of Cardamom, N.F. Dissolve Oils of Cardamom 4, Caraway 1·5, Cinnamon 1, in Alcohol (U.S.) 1000, add Glycerin 130 and finally Water to 2000.

Peptonised Milk (*v. also* Peptonising Powders, *infra*).

Mix two-thirds of a pint of fresh milk with one-third of a pint of water, and warm in a saucepan to a temperature of about 140° F. (or the diluted milk may be divided into two equal portions, one of which may be heated to the boiling point and then added to the cold portion, the mixture will then be of the required temperature). Add two teaspoonsful of Liquor Pancreatis, and half a level teaspoonful of sodium bicarbonate. Pour the mixture into a covered jug and place in a warm situation for ten to twenty minutes, then boil the product. It can then be used like ordinary milk. **Gruel** can be similarly treated. *See also* Enemata and Peptonoids of Beef.

In the place of the water half a pint of lime water may be used to the pint of milk. The preparation if desired for early use may be kept at 15° C. for three or four hours; need not necessarily be boiled.

Peptonised Beef Jelly and **Chicken Jelly** (✱Benger).

As a restorative, either may be taken alone by teaspoonsful, or dissolve two or three teaspoonsful in a teacupful of boiling water (with pepper and salt). Enriches beef tea, soups, broths, etc. They are readily assimilated by weak digestions. Containing much of the flesh-forming elements of the meat in soluble form these peptonised preparations are superior to non-peptonised extracts.

Peptonising Powders.

Pancreatic enzymes mixed with sodium bicarbonate, in glass tubes. Place the powder into a clean quart bottle with ½ pint of cool water, add a pint of fresh milk, and shake. Place the bottle in warm water for *ten minutes*, then pour the milk into a saucepan and heat quickly to boiling and allow to cool sufficiently for use. If desired, smaller proportional quantities may be utilised.

Uses.—In gastric ulcer, intestinal catarrh, for infants' use generally—and in all forms of weakened digestive functions.

Peptonising Powder for humanising Milk. *Martindale.*

To peptonise milk and simultaneously to increase the Lactose content, Lactose 400 grains containing a small proportion of Pancreatin and Sodium Bicarbonate may be added to ½ pint each of milk and cold water mixed and three to four tablespoonsful of cream. Allow to stand at about 40° C. for about 15 minutes and boil or heat the mixture in such a manner that it shall take ten minutes to reach the boiling point. Milk so treated must be kept in a cool place. To be slightly warmed again on feeding. In some instances a further dilution, *e.g.*, milk 1 to water 2 may be necessary. The result very closely approximates 6·3% Lactose, *i.e.*, the usual content in human milk.

Tablets of Pancreatin 5 grains, **Sodium Bicarbonate** 3 grains, and **Bile Salts** 2 grains. *Dose.*—1 or 2 crushed in water at the conclusion of a meal are prepared for use as an intestinal antiseptic and digestive, and may prevent formation of gallstones.

Trypsin. *Dose.*—8 to 20 grains (**0·5 to 1·2 Gm.**).

Trypsin is stated to be produced simultaneously with Amylopsin, and from the same cells in the pancreas. This ferment is prepared commercially in the form of whitish powder, possessing an odour like pepsin. It changes proteins into peptones in alkaline media. It is inactive at 75° C. One part should peptonise about 100 of coagulated egg albumen in 1½ hours.

Soluble slightly in water, more so in glycerin.

It is administered to assist digestion in diabetes, and it is occasionally employed for peptonising milk.

Stearettes of Trypsin, containing 5 grains are useful as passing intact through the stomach.

It was given hypodermically and internally and per rectum in cancer but the method fell entirely into disrepute. See Edn. XVII. p. 620.

For Muller's Trypsin Test for determining the activity of Trypsin Preparations, see Vol. II.

INSULIN.

Dose.—About 20 units per diem for a mild or moderately severe case. This amount should preferably be given in two or three injections, each injection preceding, by about 15 to 30 minutes, one of the principal meals. Severe cases may receive double or more.

Each unit (for further consideration of 'unit' see below) should enable the patient to take from 1 to 4 Gm. additional carbohydrate, or its equivalent, with the next meal, without excreting sugar. The object is to keep the blood sugar throughout the day at, or just above, normal.

The effect on the blood sugar is not exerted immediately, hence the injections are given so that their effect occurs during the period of assimilation of carbohydrates.—Banting, Campbell and Fletcher, B.M.J. i./23,8.

Manufacture.—

Brit. Patent, No. 203,778. *Complete Specification accepted* Sept. 13th, 1923. 'A METHOD OF PREPARING EXTRACTS OF PANCREAS, SUITABLE FOR ADMINISTRATION TO THE HUMAN SUBJECT.' By F. G. Banting, J. B. Collip and C. H. Best, British subjects, all of Toronto University.

The following is an abstract:—A pancreas extract containing the anti-diabetic principle or hormone. It is essential for intravenous or subcutaneous administration that the anti-diabetic principle be purified from the enzymes, proteins, lipoids and salts. Self-digestion (proposed by earlier workers) would allow the enzymes to destroy the active hormone. In this new invention Alcohol is used, which inhibits deleterious action of the enzymes on the hormone; proteins, salts and other substances are removed, as far as possible, from the solution by precipitation. An *improved* method is also mentioned in the specification, which consists in finely dividing (mincing) the pancreas and mixing it with Alcohol; straining or filtering the mixture to separate inert gland tissue; treating the filtrate with several volumes of Alcohol; removing the precipitate by filtration and concentrating the filtrate; treating the latter with Ether; eliminating the Ether; adding Alcohol; centrifugalising the mixture to form into layers, so that the uppermost one consists of Alcohol holding the hormone in solution, the lower layer or layers consisting of flocculent protein, salt solution, and salt crystals; subsequently removing the uppermost layer and treating it with several volumes of 95% Alcohol, separating by precipitation any substances which may still be present with the hormone; then distilling off the Alcohol, dissolving the hormone in distilled water and concentrating the aqueous solution, sterilising it and adding 0·5% Trikresol.

The whole theory of *hyperglycæmia* is dealt with in the patent which need hardly be detailed in our pages. It may be mentioned, however, that the communicators specifically say that prior to its conversion into glycogen, or its oxidation, glucose (normally) probably becomes altered in chemical structure, so as to be more reactive. In diabetes, the sugar absorbed from the intestine is no longer changed into an active form, therefore it cannot be stored in the liver as glycogen, nor oxidised in the tissues—hence the hyperglycæmia and the glycosuria.

The relation of the pancreas and diabetes was established by he experiments of Von Mering and Minkowski; extirpation of he pancreas in dogs was followed by persistent glycosuria. The pancreas consists of two types of tissue—the *acinar*, secreting the pancreatic juice (*external* secretion), which reaches the intestine hrough the pancreatic duct, and groups of cells, known as the **Islands of Langerhans.'** The latter show pathological changes n varying degree, in most cases dying of diabetes mellitus. Numerous workers believed that this insular portion provided an *internal* secretion, needed to normal carbohydrate metabolism, and they tried to produce extracts of it for treatment, but these extracts contained toxic substances, which resulted in their causing ocal irritation, and they were clinically unsuited.

The communicators proved by experiment that the Islands of Langerhans contain a substance which lowers the blood sugar, and diminishes or abolishes excretion of sugar in the urine of diabetic dogs. Subsequently, by extracting fœtal or adult normal pancreas with Alcohol, they made an extract which caused a lowering of blood sugar, and the glucose in the urine, when injected into a boy suffering from the disease. The Alcohol evidently prevented the destruction of the principle by the digestive ferments.

In short, "it has been proved, for the first time in the history of medical science, that a product can be made from pancreatic glands of mammalia, which will save and has saved the lives of a number of diabetic patients, many in a state of coma before the substance was given."

On injection, it converts glucose into the active form, and if given at proper intervals blood sugar is maintained at normal level, and the urine remains free of sugar. Fat is completely oxidised. Acetone bodies disappear from the urine and diabetic acidosis and coma are prevented—a restoration to normal metabolism.

It is also patented in U.S.A., Canada and other countries.

The presence of a hormone in the pancreas capable of alleviating the symptoms of diabetes has therefore been established. To F. G. Banting is due the credit of suggesting that the destructive action of trypsin and other proteolytic enzymes in the pancreas might be circumvented by taking advantage of the well-known fact that the cells which secrete the digestive enzymes become completely degenerated some weeks after ligation of the pancreatic ducts, whereas those of the Isles of Langerhans, which apparently secrete the antidiabetic hormone, remain more or less intact. Banting observed the effects produced by injection of extracts on the percentage of sugar in the blood, as well as on the total sugar excretion in the 24 hours. The untreated, depancreatised dog seldom lives 3 or 4 weeks, whereas with the extracts one was kept alive for 10 weeks in good condition. The preparation is purified by fractional precipitation with alcohol (Collip, Trans. Royal Society of Canada, 1922, Vol. XVI., Sec. V.), and is assayed pharmacologically.—J. J. R. Macleod, B.M.J. ii./22,833, 882.

For an outline of the principles of the action and use of Insulin by Banting, see Int. Conf. Trop. Am. '24, p. 728.

A description of the process in use for extraction of Insulin.—D. A. Scott and C. H. Best, C. & D., ii./25,424.

PROBABLE DUAL CONSTITUTION OF INSULIN.—Although Insulin given by the mouth to guinea-pigs had no effect upon the sugar content of the blood, it was capable of preventing the glycogenolysis following injection of Adrenalin.—P. J. Cammidge, L. ii/24,91.

Commercial Insulin is composed of ***at least three substances,*** the true pancreatic hormone A, the anti-Insulin B, and co-Insulin C. A and B have been obtained in crystalline form. A acts like the old Insulin, but in non-diabetics causes no change in blood sugar or appreciable increase. Possibly in non-diabetics there is lack of C, without which A cannot act, or superfluity of B, while in diabetics there is too much B and insufficiency of C.—C. Funk, L. ii./26,1244. This theory criticised.—P. J. Cammidge, *ibid.* 1292.

Chemically Insulin has a marked tendency to become adsorbed in any precipitate formed in its solutions. A minute dose is active. When a solution of impure Insulin is saturated with Ammonium Sulphate the activity passes into the precipitate. When Picric Acid is added to the relatively impure substance a very insoluble precipitate is formed containing all the Insulin and this can be converted into a soluble hydrochloride. (For Dudley and Starling's method by cold Alkaline Alcohol, see Bioch. Jl. 1924, 18, 147; Pres. May, '24, 176.

Treatment with 0·7 N/1 Ammonia or 0·1 N. Sodium. or Potassium Hydroxide solution, causes complete inactivation of Insulin. This is irreversible in the latter cases, but when due to Ammonia acidification restores activity. —J.C.S., A, i./24,448.

It is rapidly destroyed by Trypsin, also Pepsin. This throws light on the fact that Insulin has very little, if any, effect when given *per os.* It is stable to heat when its solution is strongly acid. It survives heating to 100° C. for half an hour. It does not approach the chemical simplicity of Adrenalin or even Thyroxin.

Chemical Composition probably $C_{69}H_{102}O_{22}N_{18}S$, a sulphur-containing compound composed of amino acids.—B.M.J. i./26,839. Another formula: $C_{45}H_{69}O_{14}N_{11}S.3H_2O$, but the actual formula may be a multiple of this.—Pres., Dec. '27,420.

Distribution in Nature. In higher animals it seems to be strictly limited to the islets of Langerhans in the pancreas. It is to be found also in certain fish. There is evidence also of the presence of something allied in yeast.—H. H. Dale, L. i./23,989.

Insulin is present in potatoes, rice, beetroot and celery. A substance having an Insulin-like action in reducing blood sugar has also been extracted from the kidney, spleen and muscle tissue of dogs and cattle.—C. H. Best and D. A. Scott, Jl. Metab. Research, Jan. 1923, per Pres. May '24,220.

Clams yielded Insulin. Collip suggested it must be present wherever Glycogen is found. Later he made it from yeast, confirming Winter and Smith, but this type differs, in that its action in lowering blood sugar is delayed, sometimes for a day or two. The same applies to Insulin-like substances from various vegetable sources styled *Glucokinin*—Prof. Macleod, B.M.J. ii./23,165.

Insulin isolated from *yeast.* An extract of yeast has an effect similar to Insulin when tested on animals and diabetics.—Winter and Smith, B.M.J. i./23,711,819.

Insulin may be obtained from the islet tissues of the cod, the yield, even under unfavourable conditions, being 13 rabbit units per Gm., and the tissue probably contains about 10 times as much, weight for weight, as mammalian tissue.—Biochem. Jl., 18, '24,665.

Preparation by Aqueous Extraction.

From an extract of the pancreas made with aqueous Formic Acid at −3° C., proteins and Insulin are precipitated as picrates. The latter is extracted by Acetone and is isolated on dilution with water. Alcoholic Acid converts this to the hydrochloride, which, although more cheaply and quickly prepared, appears as satisfactorily clinically as Insulin obtained by the Alcohol method. Average yield 300 rabbit units per kilo of pancreas.—E. C. Dodds and F. Dickens, L. i./24,330.

By adding 5% of Paraldehyde to the extracting fluid the yield was increased to 535 rabbit units; by distilling off the Acetone this was again increased to 1,040 units, and finally by eliminating the preliminary aqueous extraction and preparing the picrates simply by grinding the pancreas with solid Picric Acid a yield of 1,845 units was obtained—the highest recorded yield. The time of the complete process is reduced by this method to about one day.—E. C. Dodds and F. Dickens, Brit. Jl. Exper. Path. Apl. '24, per L. i./24,909.

Recommended that Insulin be precipitated from aqueous solution by Ammonia Sulphate (half saturated), allowed to stand for 24 hours, centrifugalised, and the supernatant fluid drawn off. The precipitate containing Insulin is dissolved in 70% Alcohol, concentrated to 1/10th its volume and added to 94% Alcohol, by which Insulin is again precipitated. 'Impure' Insulin causes delay in blood coagulation, and a case is recorded where its employment prior to operation resulted in profuse hæmorrhage, due to antithrombitic action produced.—B.M.J.E. ii./24,52.

A commercial brand of Insulin 20 units per Cc., was found to contain 0·45% organic matter on evaporation and to give only slight reactions for proteins.—W. H. M.

Crystalline Insulin.

Preparation:—A rich fraction of Insulin is dissolved in Acetic Acid and precipitated by a Brucine solution. The clear liquid containing the Insulin is separated and treated with Pyridine with which a crystalline precipitate is formed. This is redissolved in Acetic Acid and again precipitated with Pyridine. The crystals melt at 233°, and in a dose of 0·01 mg. causes hypoglycæmic convulsions in rabbits.—J. J. Abel, Johns Hopkins Univ., per Pres., Dec. '26,426. *See also* Jl. Ph. and Exp. Ther., May '27,65.

Tablets of Insulin Hydrochloride each equivalent to 10 units are prepared. To be dissolved in 0.5 Cc. of sterile distilled water.

Keeping Properties of Insulin.

The fear that Insulin may deteriorate in hot climates is unfounded, the unfavourable results of Taylor & Douglas's tests being mainly due to the Indian rabbit behaving differently from the English rabbit.—L. i./24,508.

Further researches on preservation of Insulin. In **solid form** does not undergo alteration at high temperature. Difference in preservation in liquid form due to hydrolysis causing deterioration in pharmaco-dynamic properties.—E. Trocello and A. Cruto, Jl. Trop. Med., Jan. 1/26,1.

Solid Insulin shows far greater resistance to tropical and high temperatures than the aqueous solution.—Jl. Trop. Med., Mar. 2, '25,104.

Units.—The methods for determining these are not considered accurate, and the reactions of patients vary within wide limits; great care has therefore to be taken. The directions on the bottles of the injection should be carefully read.

A unit was originally taken as the amount of Insulin which on subcutaneous injection can lower the percentage of blood sugar to 0·045 within four hours in a rabbit weighing about 2 kg. from which food has been withheld for sixteen to twenty-four hours. Such Insulin was first prepared so that 1 Cc. contains one unit.

Subsequently the U.S.A. makers brought in a unit with approximately *one third* of the Toronto unit, and the Medical Research Council adopted the U.S.A. unit—*i.e.*, *three* units, as at present defined, produce this reduction in blood sugar (to 0·04%) with standard conditions (in 2 hours). The average single dose for an adult is 10 New Style units, *i.e.*, 3 to 4 times the quantity for the rabbit. Think in units rather than so-called 'doses.'—M.R.C., B.M.J. i./23,737. See also Prof. H. Maclean, L. i./23,1044.

Five kilos of beef pancreas yield about 200 to 400 units of Insulin.—H. F. Moore, L. i./23,715.

The process of manufacture and purification of Insulin was improved in the laboratories of the National Institute of Medical Research to the extent that finally about 3 mgr. (1/20 grain) represents an average human dose.—L. i./23,861. In other words 1/200 grain = 1 unit.

As a result of an International Conference, held under the auspices of the **Health Committee** of the **League of Nations,** to discuss the question of biological standards, Great Britain has assumed the responsibility for Insulin, and the National Institute accepted the duty of preparing and keeping the **International standard** of reference. Simultaneous determinations made by the National Institute (on material made by that Institute), the Insulin Committee of the University of Toronto, and three other laboratories in the U.S.A. and in this country, varied only between 8·4 and 8·8 units per mg. of the dried preparation, and the International Conference therefore accepted the recommendation of the Toronto Committee that this preparation, preserved at the National Institute, should be the International Standard for Insulin, and 1 mg. thereof should be taken to contain 8 units of Insulin. —B.M.J., i./26,251.

A study of the rabbit as a test animal. The 'convulsions' test is untrustworthy.—Amer. Jl. Physiol., '23,66,461, per J.C.S., A. ii./24,636.

The biological assay of Insulin preparations in comparison with a stable standard.—H. P. Marks, B.M.J., ii./25,1102.

Clinical assay of Insulin preparations.—G. A. Harrison and R. D. Lawrence, B.M.J., ii./25,1104.

Technique of Injection.—The injection is given subcutaneously in the upper arm. In cases of extreme collapse, it can be used intravenously without danger. If given *per os* it has no demonstrable action. For diabetic coma 20 units immediately. *Glucose should be given simultaneously,* either *per os,* or by stomach tube, or intravenously. In all cases give fluid at the same time.

A solution containing 1·8% Sodium Chloride and N/1000 Sodium Hydrate mixed with equal parts of a commercial brand of Insulin, renders injection painless.—O. Leyton, L. i./24,1082.

Suitability of the Case.—The patentees point out that the indiscriminate use of their product is a source of danger. All cases, except those suffering from severe acidosis and coma should be put to bed and given a basal maintenance diet—protein, in sufficient quantity, to replace the daily wear on the tissues, approximately 0·3 Gm. per lb. body weight. Additional calories in food are supplied by carbohydrates and fat in proper proportion to prevent production of acetone bodies. If the urine of patient becomes sugar free on this, it should be gradually raised to an adequate diet for his ordinary duties. If he remains aglycosuric the treatment with Insulin is not indicated. 75% of diabetics can be controlled by diet. If at the end of the week's treatment on basal diet, the urine is not free of sugar, the patient requires Insulin.

There is no evidence as yet that the treatment is curative. It is not recommended unless the treatment can be continued. The initial stages of treatment should be carried out in connection with facilities for blood and urine sugar estimations.

Contraindication.—It is dangerous in cases of so-called 'renal glycosuria' or **diabetes innocens,** in which the kidney fails to hold back the normal amount of glucose in the blood, *i.e.,* the patient is already in a condition of persistent hypo-glycæmia.

Hypoglycæmia: Effects of excessive dose.—There is a rapid fall of blood sugar following a single injection. This blood sugar content reaches a low point in 2 to 8 hours, and tends to return to the original level in 12 to 24 hours. When the blood sugar percentage falls to 0·07 (the normal being 0·1%) under a dose the patient may first complain of hunger, weakness or fatigue; he may even show signs of a definite neurosis with loss of emotional control, such as crying spells. A lowering to 0·05% produces very acute distress or mental disturbance.

These reactions are relieved by food; 50 to 100 Cc. of orange juice is effectual or 5 to 25 Gm. of Glucose with the orange juice. When the patient is unconscious give 1 Cc. Epinephrin solution (1 in 1000), intramuscularly, followed by Glucose *per os.*

Nurse with care, because reactions may occur during sleep.—Banting and co-workers.—B.M.J. i./23,8.

The Medical Research Council directions add, that, *if necessary, 5 to 20 Gm. of glucose in 50 to 100 Cc. of diluent may be given intravenously, and that out-patients under treatment should carry sugar with them to be eaten at the first sign of these hypoglycæmic reactions.*

In one case, 25 units subcutaneously reduced the fasting blood sugar from 0·181 to 0·07% in 2 hours 20 minutes, and abolished a moderate glycosuria. In another case, 16 units reduced it from 0·216 to 0·117% in 1$\frac{3}{4}$ hours, and abolished a heavy glycosuria.—H. F. Moore, L. i./23,715.

Banting, Best, Collip, Campbell and Fletcher published a preliminary report on the treatment of severe cases of diabetes mellitus with Insulin.—Can. Med. Assn. Jl., March, 1922. Excretion of sugar in the urine decreased and sometimes completely cleared up. Coincident with this decrease in sugar excretion was a lowering in blood sugar level. This could be brought to normal, it was found, by adjustment of dosage. Ketone bodies disappeared from the urine in 24 to 48 hours. An account of the first 50 cases treated shows as follows:—On the first or second day of treatment if sufficient Insulin is given, the urine becomes sugar-free, and on the second or third day, ketone-free. Patients become cheerful and interested, hunger is replaced by appetite, thirst is lessened, œdema (which is common) disappears, and weight increases. As originally stated, ketonuria, under Insulin, was relieved in a striking manner. Insulin, indeed, is even hopeful in *diabetic coma.* It is given, in such cases, either subcutaneously or intravenously, followed by subcutaneous injections. The dose was usually, though not always, far in excess of requirement. The danger of a hypoglycæmic reaction is guarded against by sufficient Glucose given intravenously at the same time. Diabetes in children, it is stated, is readily responsive to treatment.—B.M.J. i./23,8.

Only a few severe cases require more than 45 units daily: most cases regain strength and weight on 10 to 20 units daily. The secret of success lies in correct balancing of diet against dose employed.—F. G. Banting, B.M.J. ii./24,376.

The ***estimation of blood sugar*** can be performed by any medical man with a minimum of chemical knowledge. The equipment costs a few pounds.—Prof. H. Maclean, L. i./23, 1043.

For Methods of conducting the Estimation, see Vol. II.

CLINICAL EXPERIENCE IN ENGLISH AND SCOTTISH HOSPITALS in less than 50 cases. It was found that 1 unit of Insulin could provide for the consumption of 2 Gm. of carbohydrate taken as such in the food of a completely diabetic patient. This is equivalent to 4 Gm. of protein, but no rule can be laid down. In this paper the subject of various forms of *diabetic coma* is dealt with. The consideration of *hypoglycæmic collapse* is of interest—an entirely novel conception that has come into pathological thought, as the result of experience with Insulin. It is caused by the artificial lowering of the blood sugar to half its normal level, and it is at once relieved by giving sugar.—Med. Res. Council Rept., B.M.J. i./23,737.

Influence of Insulin on acidosis and lipæmia in diabetes. When given *together with carbohydrates* to patients with diabetic acidosis, verging on coma, there is a spectacular effect. Importance of combining the two. If given alone it may increase the acidosis.—Prof. J. C. Meakins and Co-workers, B.M.J. i./23,847.

Prof. Maclean insists that diabetes is not only a carbohydrate derangement. Defects in fat and protein metabolism may play an equally large part in the malady. In the estimation of blood sugar 0·2 Cc. of the blood is used.—Review of book, B.M.J. i./23,974.

Inunction of Insulin with Lanolin and with lard—rabbit experiments. The conclusion is that apparently Insulin can be introduced by this measure. Crude Insulin extracts could be used.—S. V. Telfer, B.M.J. i./23,715.

Inunction in 6 children. It was proved that Insulin is easily absorbed by the intact skin, its action being greater in infants than in children of more advanced years. In the case of an infant of one year, weighing 9 kilos, Insulin inunction reduced concentration of sugar in blood so successfully that experiment had to be discontinued prematurely.—L. i./24,407.

Insulin used as an inunction in Almond Oil, in Hydrous Wool Fat, and in Alcohol and Glycerol, was found to have no therapeutic value.—Qrtrly. Jl. Med., Jan. '27,187, per Pres., May '27,199.

Oral Use.—Insulin produces an inappreciable diminution in blood sugar of normal and diabetic individuals. Rubbed in, in Olive Oil, produces in some a definite fall in blood-sugar.—P.J. i./24,555.

Insulin by the mouth. Olive Oil used as a vehicle gives much better results than Alcohol.—B.M.J.E. i./24,77.

Oral administration of Insulin unpleasant and valueless.—B.M.J.E., i./27,2.

Pancreatic preparations *per os.*—P. J. Cammidge, B.M.J. ii./25,1216.

γ Glucose.—The normal blood sugar in man and animals has a lower rotatory power than would be given by the α-β equilibrium form of glucose as deduced from the copper reduction value. It is suggested that normal blood sugar is γ glucose, and that it is absent in amounts capable of detection in diabetes mellitus, and that α-β glucose cannot be directly stored or utilised, but that an enzyme is responsible for the conversion of it into γ glucose. It is thought that the effect of Insulin is to activate the enzyme responsible for the conversion of α-β glucose into γ glucose.—L. B. Winter and W. Smith, B.M.J. i./23,12,479.

There is *no* evidence of the existence of γ glucose as a compound of normal blood. Winter and Smith's theories are considered as without experimental foundation.—J. A. Hewitt, B.M.J. i./23,590.

Prof. Hewitt's further criticism of Winter and Smith's work.—B.M.J. i./23,994.

Treatment of diabetic patients with Insulin causes the alkali reserve and the pH of the plasma, both of which are lowered, to return to normal.—Jl. Biol. Chem., '23,57,541, J.C.S., A. i./23,123.

With dogs, injections of Insulin decrease the concentration of Glucose, inorganic Phosphate and Potassium in the blood and increase the concentration of Lactic Acid. It is believed that Insulin influences the reversible reaction, Glucose $\leftrightarrows$ Lactic Acid.—J. Biol. Chem., '24,58,721, per J.C.S., A. i./24,445.

The **Zymase** group of ferments might have properties similar to Insulin —O. Leyton, B.M.J. ii./22,1144,1233.

Yeast possibly acts on sugar by converting it first into an unstable form. It is by no means certain that diabetes is invariably a disease of the pancreas. —Leader, L. i./23,708.

GENERAL REFERENCES.

Leader on early work—a useful summary.—L. ii./22,398. See also B.M.J. ii./22,991.

Prognosis in Diabetes Mellitus.—A degree of hyperglycæmia may still be present, even when sugar no longer appears in the urine.—D. M. Lyon, L. i./22,1043.

If sugar found and it then disappears, determine if the power of sugar destruction is diminished; give 100 Gm. glucose in 1 litre of water before breakfast. If the power is diminished sugar is found in the urine ½ hour to 3 hours afterwards. If sugar destruction is normal the urine will be free from sugar.—R. T. Williamson, Pr. Oct. 1920.

Factors controlling the blood sugar content.—P. J. Cammidge, J. A. Cairns Forsyth and H. A. H. Coward, B.M.J. ii./21,586.

Drugs in Diabetes. Having in mind the depressing effect of *Atropine* on secretions of the body, this (as Belladonna Tincture) was tried in a case. Patient could take more carbohydrate, protein and fat and was able to follow his occupation. It has a pronounced influence on sugar content of the blood. With regard to metals, *Colloidal Palladium* appears to be specially useful in hepatic glycosurias. Uranium Nitrate appears to act at first as depressant of the diastatic ferment of the liver like Palladium, but when continued for some time the effect is diminished. With regard to organotherapy, pancreas preparations *per os* may be actually harmful. With regard to Insulin, it probably has only a brief effect on food tolerance.—P. J. Cammidge and co-workers, L. ii./22,1324. B.M.J. i./23,787.

The diabetic fails to store sugar, as shown by the blood sugar becoming excessive. He fails to burn sugar, as shown by his respiratory quotient being too low. The injection lowers his blood sugar and raises his respiratory quotient.—O. Leyton, B.M.J. i./23,707.

Injections of Pituitary given simultaneously with Insulin either reduce, or abolish or replace, by a rise of blood sugar, the fall due to Insulin. The work confirms, as is known that in cases of pituitary insufficiency there is a raised carbohydrate intolerance.—Proceedings of Physiological Society, Feb. 1923, M.P.C. May 9/23,369.

Insulin greatly reduces the hyperglycæmic action of Adrenalin.—J. H. Burn, per Pres., Oct. 23,334.

Pituitrin secretion is increased by injection of Insulin just as it has been shown to increase adrenalin but this secretion is not obvious in the case of the pituitary until the blood sugar has been considerably reduced.—W. E. Dixon and J. H. Wadia, B.M.J. i./26,820.

It is unwise to give any carbohydrate at all, except that in vegetables, until the fasting value of the blood sugar has been below 0·12% for some considerable time.—G. Graham and C. F. Harris, L. i./23,1150.

Excessive Insulin dosage in diabetic gangrene is dangerous.—H. F. Root, L. ii./26,544.

A case is cited of a diabetic patient whose daily urine sugar content prior to treatment was 270 Gm., which fell first to 85, then to 60, 30, 15, 9 and 5 Gm. after Insulin injections twice daily were begun.—Chabanier, Lobo-Onell and Lambert, per P.J. i./23, 456.

Diabetes mellitus. It is not the purpose of treatment to eliminate glycosuria in all circumstances. Liberal diet with slight glycosuria often beneficial.—Lenné, per Jl. Trop. Med., Sept. 16/22,298.

The treatment of diabetes—with special reference to Insulin.—Sir W. H. Willcox, Pr. Dec. '23,377.

The necessity for frequent estimations of the blood sugar during treatment is not regarded essential in ordinary cases. Test the urine with Fehling's solution. Do not attempt to get a constantly sugar-free urine—a trace of sugar in the morning is a safeguard.—A. Innes, B.M.J. i./24,55; Pres. May '24,216.

The **Glucose equivalent** (*i.e.*, the amount of Glucose which one unit of Insulin can metabolise) varies with the dose given and with the amount of carbohydrate in the diet. When carbohydrate ingestion is constant the Glucose equivalent per unit becomes progressively smaller as the dose is increased.—F. N. Allan, Am. Jl. Phys, '24, Jan., p. 275, per Pres. May '24,219.

The physiology of Insulin.—Pres., May '26,209-211.

Before operating on diabetic patients it is better to give adequate diet with Insulin (very large doses given), to reduce blood-sugar rather than under-feed.—R. Carrasco-Formiguera, L. i./25,1076.

The diet of a patient receiving Insulin is just as important as its necessity without Insulin treatment. When given as a luxury, 1 unit of Insulin is calculated to lead to the oxidation of 3 Gm. of Carbohydrate, this being checked by frequent blood-sugar examination. In patients with more advanced diabetes mellitus 1 unit of Insulin is required for the utilisation of 1 Gm. of carbohydrate, protein being 60% potential carbohydrate, 60 units are thus needed to allow a diet of 30 Gm. carbohydrate, 50 Gm. protein, together with sufficient fat to supply the energy of nearly 30 calories per kilo; this amount being required to allow the individual to work.—O. Leyton, Pr. Aug. 23/125.

A standard diet for Insulin treatment.—A. C. Begg, L. i./24,516.

Complications following Insulin treatment—severe cases of sepsis observed in spite of all precautions.—B.M.J.E. ii./24,9.

Danger of Insulin treatment by the patient at home, using the urine as a check on the blood-sugar count.—Pres., Dec. '24,408.

Importance of urinary examinations in all cases of coma in children.—Pres., Dec. '24,408.

In cases requiring three doses a day, the long night period causes hyperglycæmia to develop. Counteract by giving last dose after supper and first dose 1 hour before breakfast.—Pres., Dec. 24,408.

Diabetic Treatment Simplified.

The main issues are (1) the quantity of sugar excreted day by day; (2) presence or absence of Ketones; (3) treatment by regulating quantity and quality of the diet, or by Insulin; (4) blood sugar (in special cases). The patient himself measures and charts daily variations in sugar excretion by taking the Sp. Gr. and then fermenting his specimen with a pennyworth of Yeast in a Thermos Flask overnight and recording Sp. Gr. again. If Insulin is being given in private practice, this daily chart is useful in helping to leave behind a little sugar (1 or 2 grains per ounce) in the urine, as a safeguard against hypoglycæmia. Calories are anathematised. Man varies. The patient is put on to a diet free from carbohydrate, gradually. If sugar persists and no Ketones appear, diminish the quantity. If Ketones appear, 1 to 3 ounces of bread (weighed) is added and enough Insulin injected to bring the sugar almost to zero. As to Insulin, danger of hypoglycæmia can be guarded against by the patient carrying a little sugar about with him. As to Ketones, the Ferric Chloride test is best. The Nitro-Prusside test is too sensitive. Their presence indicates that the fats in the system are not being properly burnt up. If they appear, watch for coma: ignore the sugar and give alkalis freely and more bread.—F. C. Eve, B.M.J. i./25,1033.

Satisfactory treatment of diabetics as out-patients, the routine tests being blood sugar and urine estimations, and weight. Colds and similar minor ailments, and overstrain and worry, caused increase in blood-sugar percentages.—C. J. C. Earl, B.M.J., i./27,831.

No true case of diabetes, however severe, proves refractory to Insulin. Failure is sometimes due to renal glycosuria without hyperglycæmia. Hepatic glycosuria is refractory but is not true diabetes. Diebetic cases with cirrhosis of liver take longer but ultimately respond. Some cases of glycosuria may be refractory owing to disorders of thyroid, pituitary or suprarenal. Diabetes complicated by severe infections ultimately respond to Insulin, if given big enough doses. Many cases of failure of Insulin are due to the patient surreptitiously increasing the diet.—Prof. Marcel Labbé, per B.M.J., i./27,530.

Acetonuric vomiting of children from 4 to 6 years well treated with 10 to 15 units of Insulin subcutaneously, followed by carbohydrate meal. Effect of Insulin lasted three hours.—Per Jl. A.M.A., ii./25,1167.

Acidosis a much more important factor in diabetes than hyperglycæmia. Importation of foreign Insulin prohibited in France, and French products insufficiently standardised. Best results from subcutaneous or intramuscular injections. For 'intensive treatment,' 40 units injected initially, then 20 units every 2 hours, while coma persists and sugar does not fall. Patient should receive 200—300 units during first 24 hours, a 4% solution of Glucose being given at the same time subcutaneously, or if urgent intravenously.—B.M.J.E., i./26,38.

As much as 200 units a day needed in some cases.—G. Graham, B.M.J., ii./25,702.

Carbohydrate metabolism in health and disease.—Hugh Maclean, L. i./26, 1129,1242.

A review of the later results of Insulin treatment.—A. P. Thomson, B.M.J., i./26,613.

Blood sugar in the normal and diabetic.—C. D. Shapland, L. ii./26,589.

Insulin is not entirely destroyed by digestion. Insulin does not represent the entire pancreas value. Oral pancreas therapy of certain value, and probably supplies what is lacking in Insulin. Fallacious to evaluate pancreas products on basis of Insulin content.—H. R. Harrower, Am. Med., July '25, 427, per Pres., May '26,209.

Insulin is no longer looked on as a cure for diabetes. Only necessary in about one-third of cases, *i.e.*, mainly in patients suffering from complications such as gangrene or acidosis. In true pancreatic diabetes Insulin acts as substitute for missing internal secretions, and in other forms allows physiological rest for the exhausted gland.—P. J. Cammidge, B.M.J., ii./25,1129.

Given *per os* with Saponin caused blood sugar to fall; tried in diabetes.—B.M.J.E., ii./26,49.

The addition of small quantities of Nickel or Cobalt seems clearly to enhance the therapeutic effects of Insulin.—L. ii./26,94.

Potassium ions enhance and Calcium ions reduce the effect of Insulin on the blood sugar.—Per Jl. A.M.A., ii./25,859.

Anaphylaxis due to Insulin.—B.M.J.E., ii./25,13.

Only one diabetic patient seen who failed entirely to respond to Insulin administration.—Prof. H. Maclean, The Results of Insulin Therapy in Diabetes Mellitus, B.M.A., 1927, B.M.J., ii./27,1015 : see also *ibid.* Prof. K. A. Petren, 1019 and P. J. Cammidge, 1020.

Insulin in Surgery.

Patients suffering from carbuncles, gangrene of leg, appendicitis, etc. should be prepared for operation by treatment with Insulin. Minor ailments, e.g., tonsillitis, 'colds in the head,' etc., should always be taken seriously and patient should go to bed. It is better to reduce diet by one-third and add another 5 units to dose of Insulin. The relief of constipation is always of great importance.—G. Graham, L. i./24,65.

By injection and local application Insulin is stated to facilitate the cicatrisation of the operation wound and favour healing in non-diabetics.—L. ii./25,241; see also B.M.J.E., i./26,52.

EXOPHTHALMIC GOITRE well treated by Insulin, 5 to 30 units twice daily. —E. G. B. Calvert, B.M.J., ii./24,835. See also Jl. A.M.A., ii./25,1522 : and *ibid.* 1007.

Of value only in the pancreatogenous type of exophthalmic goitre, but fails in cases of thyroid origin, and those due to primary hypophyseal disease. —O. Klein, Med. Klin., Feb. 12, '26,248, per Pres., May, '26,214; B.M.J.E., i./26,56.

HYPERTHYROIDISM :—Insulin in treatment.—Jl. A.M.A., ii./25,1098. Action variable and inconstant.—M. R. Castex, Rev. de la Soc. de Med. Intern., Sept. '25,471, per Pres., May, '26,214.

GRAVES'S DISEASE.—Rapid improvement in 3 out of 4 cases treated.—B.M.J.E., ii./24,13.

PREGNANCY, VOMITING OF.—Combined use of Glucose intravenously with Insulin hypodermically—about 2 Gm. Glucose in 10% solution to each unit of Insulin—of value in excessive vomiting of pregnancy and in eclampsia.—Jl. A.M.A., i./26,557.

SKIN DISEASES : Insulin in treatment.—M. Ferond, Le Scalpel, Mar. 6, '26,221, per Pres., Oct. '26,344.

VARICOSE ULCERS.—Insulin injected, and locally, found of value.—P.J., ii./25,180. Ulcers of leg well treated.—B.M.J.E., ii./25,10.

Insulin applied locally (12 units twice a day in the form of a wet dressing) completely healed a resistant non-diabetic ulcer of 5 months' standing in 10 days.—Per Jl. A.M.A., ii./25,473.

***Synthalin** (T.M. 351691).

An Alkyl-Guanidine derivative, with action similar to Insulin, which has been advocated more particularly for slight or moderately severe cases of diabetes. It is taken internally in a single dose of one tablet, containing 10 mgr., 2 tablets 20 mgr., or one tablet 25 mgr., at the commencement of a meal.

For light and moderate cases.—By dietetic treatment the sugar eliminated must have been adjusted to at most 30-45 grains per day.

On the 1st and 3rd day two 10 mgr. tablets twice, on the second day 2 tablets on one occasion. A respite on the 4th day and then gradually pass from two 10 mgr. tablets to 25 mgr. Directions are varied for other types.

Synthalin lowers sugar excretion by the urine. 1 mgr. is capable of using 1·1 to 1·2 Gm. of sugar. The substance is not a simple derivative of Guanidine or even a simple homologue of the Methylene series. It is intended to improve its composition.—E. Frank, Klin. Woch. '26,45.

Clinical reports are not entirely favourable. It is slow in action, rendering it useless in coma, but its effect lasts longer and is more cumulative than with

Insulin, some are intolerant of the drug, especially tuberculous patients and those suffering from abdominal complaints. Women are more susceptible than men.—Per Pres., June '27,231. In dosage needed to get the same results as with Insulin it upsets the mucous membrane of stomach or intestine and has to be stopped. It has a bad effect on the appetite, and the patient gets thinner and shows asthenia. Alternate courses of Synthalin and Insulin not recommended. It cannot be given continuously. In its present form it is not of much practical value.—Per L. i./26,1266. Only of use in certain selected cases.—L. i./27,36.

Notes on Synthalin.—A. W. Edwards, P.J., ii./27,292

Preliminary Reports to the Medical Research Council show Synthalin to be unsatisfactory.—L. ii./27,517, *ibid.* 649. Results uneven.—G. Graham and R. D. Lawrence, B.M.J., ii./27,1143.

In rabbits, Synthalin, or Decamethylene-diguanidine, in large doses was toxic. The fate of the Glucose was not quite clear: experiments proceeding.—H. H. Dale, B.M.J., ii./27,1141.

The name Synthalin was applied to the Methyl Ester of Piperonyl-Quinoline Carbonic Acid. Danger of identity of name for two totally different substances.—Y.B.P., 27,298.

Glukhorment (Noorden) shown to contain a substance closely resembling Synthalin.—H. H. Dale and H. W. Dudley, B.M.J., ii/27,1027.

Galegin, the alkaloid of *Galega Officinalis,* has a similar constitution to Synthalin and has been used for reducing blood-sugar, up to 150 mgr. per day replacing 20 to 30 Insulin units. No secondary effects observed.—P.J., ii./27,563.

Glucosone, or aldofructose (one of the oxidation products of Glucose or Fructose) has similar properties to Insulin and is given by the mouth.—P.T. Herring, L. i./27,1000.

Intarvin.—An artificial fat made from fatty acids, having an odd number of Carbon atoms and proposed for use in diabetes, on the ground that such fatty acids do not yield ketone bodies on oxidation in the normal or diabetic organism, and might therefore with advantage replace natural fats in the diet (N.N.R., '25,219). From clinical observations, however, on cases of diabetes mellitus, it would seem that further investigations are needed to substantiate the claims made.—D. Lyon and Co-workers, B.M.J., i./25,209.

PAPAIN.

Syn. PAPAYOTIN. *Dose.*—1 to 8 grains (0·06 to 0·5 Gm.).

Whitish, amorphous powder, prepared from the juice of the Papaw, *Carica Papaya* (*Passifloraceæ.*) 75% should be dissolved by absolute alcohol.

Papaw fruit, fresh, divested of its seeds, in shape like a vegetable marrow, is a refreshing dessert fruit, with flavour something like the melon. It is commonly used as a table fruit abroad. It is thought to have digestive properties. The author has imported the fruit '*canned*' in syrup. The tree is indigenous in India, East and West Indies, Hawaiian Islands, in Ceylon and other tropical parts.

Manufacture of Papain.—The fruit while remaining on the tree is lightly incised several times at intervals of 2 or 3 days with a bone knife and juice collected in calabashes containing a little water. The juice is rapidly dried—the coagulated milk being exposed to the sun or artificial heat on glass or linen frames at not exceeding 100° F., subsequently while still warm powder in a drug mill.

The natural colour of Papain is light brown. Bleaching is said to be a great mistake. Adulterants include bread, boiled rice, starch and the milk of gutta percha and thewild cactus.

The fruit is sometimes called the tree melon. The leaves are used for wrapping round fresh meat to render it tender. The juice of the fruit is also rubbed into meat for this purpose or a piece of the fruit is placed in the water in which the meat is boiled. A tree bears on an average thirty fruits a year and lasts some 5 years as productive and worth cultivation. A trace of formalin should be added to the juice as collected by scarification. A dozen fruits yield about $\frac{1}{2}$ lb. of dried granulated crude papain at one tapping. Huybertsz found the Ceylon Papain will digest 200 or 300 times its weight of albumen, while West Indian only digests 75.—H. F. MacMillan, C.D., Jan. 30, 1915.

Assay.—Examination showed that 0·4 Gm. Papain will peptonise 100 Cc. of 4% Alkaline Casein Solution in 1 hour.

Uses.—As a digestive in chronic cases of dyspepsia with acid eructations and painful gastric fermentation. It acts in acid, alkaline, or neutral media, has the property of digesting fibrin like pepsin (as much as 200 times its weight in some cases).

The Liquid preparations are suitable for use in cases of enlarged tonsils—after persevering treatment, improvement in nasal breathing can be observed—due to reduction of the swellings.

It has the property of curdling milk like rennet and might be used as a substitute for the latter.

Ulcers and fissures of the tongue have been painted with a solution of Papain 1 to 2 in 10 each of glycerin and water. It is a vermifuge destructive to ascarides and tænia.

Elixir Papain.—*Martindale.*
Dose.—1 drachm (4 Cc.) with meals.

Glycerinum Papain.—*Martindale.*
Dose.—1 drachm (4 Cc.) with meals as a digestive.

It has also been used as a pigment for chronic eczema and warts, and has been applied to diphtheritic exudation.

Tabellæ (of chocolate basis) contain 2 grains (0.12 Gm.).

Trochisci $\frac{1}{2}$ grain (0·03 Gm.).

D P 1 **Trochisci Papain** ($\frac{1}{5}$ grain) **et Cocainæ** ($\frac{1}{10}$ grain). These, if slowly sucked, are useful for ulcers, warts or sores on tongue, &c.

P 1 **Pilula Papain Composita.**
Dose.—1 with meals. Papain 2 grains, Extracts of Nux Vomica $\frac{1}{8}$ grain, Belladonna $\frac{1}{6}$ grain, Aloes $\frac{1}{4}$ grain. A digestive laxative.

Pulvis Papain Compositus. E.L. *Dose.*—5 grains (0·3 Gm.). Papain 1, Sodium Carbonate 2, Sugar 2.

Liquor Papain et Iridin.
Dose.—2 to 4 drachms (8 to 15 Cc.). Papain 120 grains, Iridin 150 grains, Glycerin 2 ounces, Sherry 5 ounces, Chloroform Water to 1 pint. Macerate 7 days and filter.—From Ph. Form., 1911, p. 890 modified.

PARAFFINA.

The Paraffins used in Pharmacy are arranged herein in order of consistency, commencing with the Hard and following in rotation with soft compounds, Liquid Paraffins of various gravities, and finally the light fractions known as Amyl Hydride, Petroleum Spirit, etc.

Paraffinum Durum.—*Syn.* PARAFFIN WAX.

A mixture of several of the harder members of the paraffin series of hydrocarbons $C_{20}H_{42}=282{\cdot}336$ to $C_{27}H_{56}=380{\cdot}448$; obtained, by distilling shale, separation of the liquid oils by refrigeration, and purification of the solid product. Colourless, semi-transparent, crystalline, inodorous, and tasteless, slightly greasy to the touch. Sp. Gr. 0·82 to 0·94. Insoluble in water, slightly soluble in absolute alcohol, soluble about 1 in 80 in ether. It burns with a bright flame, leaving no residue. Hard paraffins are supplied with the following melting points:—100°, 104°, 110°, 115°, 120°, 125°, 127°, 130°, 135° F. (*B.P.* '14) employs from 122° to 140° F.

U.S. has M.pt. 50 to 57° C. (122 to 135°F).

Ceresin. A hard white paraffin prepared from ozokerite or earth wax; has M.pt. about 130° F. When artificially coloured to resemble yellow wax it is sold as **Yellow Ceresin.** **Ozokerit** is a hard paraffin obtained from Galician deposits.

Paraffin Solid, Sterilised.

For subcutaneous injection in plastic operations this should be hard paraffin with M. pt. 110—115° F. *not an extempore mixture.* Used to improve the size and shape of the nose, ear, &c., where abnormal, also for injecting into cavities after previously swabbing out with antiseptic Lotion.

The injection should be made in a warm room to allow of the flow of the melted substance through the syringe needle.

In facial surgery.—S. Mort, L. ii./19,105.

Ozæna treated by injecting high melting paraffin into the nasal septum.—B.M.J.E. i./15,36.

Paraffinum Molle (*B.P.* '14).—*Syn.* PETROLATUM, U.S. and PETROLATUM ALBUM, U.S., PETROLEUM JELLY.

A white or yellow semi-solid mixture containing some of the softer or more fluid members of the paraffin series of hydrocarbons $C_{15}H_{32}=212{\cdot}256$ to $C_{20}H_{42}=282{\cdot}336$. Melts at 42 to 46° C., or even somewhat higher (U.S. requires 38 to 54° C.). Is usually obtained by purifying the less volatile portions of petroleum.

Soluble in alcohol slightly, freely in ether and chloroform, insoluble in water. When melted, it mixes with oils, and many waxes, oleates, and oleic acid.

Soft paraffin is not readily absorbed, but is emollient, protective and useful for surface action, *e.g.*, for compounding with lead, mercury, zinc, and sulphur iodide.

Absorbtion.

It is commonly thought that Paraffins injected into tissues (as in Beck's Bismuth Paste) are not absorbed. It was proved in Germany that this only applies to hard paraffin.

Intra-articular injections of Vaseline admirable in certain cases of painful and grating joints including morbus coxæ senilis and dry traumatic arthritis For a knee joint 15 Cc., for the hip 20 to 25 Cc. If the joint contains fluid, its further secretion may only be stimulated by injection of Vaseline.—B.M.J.E. ii./13,78.

***Vaseline** (T.M. 12486, 479708) Brand Petroleum Jelly is available in yellow and white varieties.
It resembles the **Vaseline Officinale** or **Pétroléine** of the Fr. Cx.—that which remains over after distilling American Petroleum at 360° C. and purifying. 2 to 5% 'Paraffin' is directed to be added according to season or climate to improve its consistence.

High Melting "Vaseline" is also prepared with M.pt. 46·1° C. (115° F.)., suitable for warm climates.

Unguentum Paraffini made with Hard Paraffin (M.Pt 54 to 57° C.) 27, Soft Paraffin 70, Beeswax 3, is suitable for use with the atmospheric temperature, 15° C. May be modified to meet the exigencies of climate and temperature.
The addition of 3% Beeswax makes the ointment more uniform.
A Hard Paraffin with somewhat low melting point, *e.g.*, 46 to 52° C. is best. Our experiments showed it is well to melt together and set aside to crystallise (or allowed to cool on the water bath) and then mill, rub down, or sieve again.
A small quantity of wool fat added to soft or liquid paraffins enables the production of a stable Emulsion, *vide* Vasenol.

Ceratum Petrolei is a firmer basis than the Soft Paraffin and is a good protective.
White Soft Paraffin 2 parts, Hard Paraffin (135° to 140°) 1 part. Melt and stir until cold in an evaporating dish.

'Collapsubes' of Soft Paraffin with catheter and rectal attachments are suitable for uterine and rectal medication. The base may be medicated with antiseptics and astringents; for formulæ, *vide* Index.

Ceratum, U.S. White Wax 30, Benzoated Lard 70. Melted together and stirred until the cerate congeals. In hot seasons and warm latitudes, White Wax 50 or more may replace an equal weight of Benzoated Lard.

Paraffin Treatment of Burns.

Paraffin "No. 7" is made as follows:—
Melt Hard Paraffin 67·75 and add Soft Paraffin 25 and Olive Oil 5. Then mix in carefully Beta-Naphthol 0·25 dissolved in Eucalyptus Oil 2, after the mixture has cooled to about 55° C. (The original mentions Resorcin 0·25 to 1% as alternative and that a small quantity of Absolute Alcohol is to be used as solvent). The finished article melts at about 48° C.

Method of Use.—Wash the burns with sterile water, dry thoroughly for example with a fan and spray or apply the melted preparation carefully with a flat camel hair brush. Cover with a thin layer of wool and a second coating.

Severe burns accompanied by sloughing and in a very septic condition cleaned and became healthy. Cordite, Petrol and Liquid fire burns healed. Also suggested for frost bite.—A. J. Hull, B.M.J. i./17,37. Wounds and Burns treated—nothing so effectual.—E. F. Pratt, B.M.J. i./19,243.
Other formulæ.—No. 10 Red (containing scarlet), No. 12 Brilliant Green No. 13 Flavine Wax, No. 14 Dichloramine Wax. The No. 7 with preliminary painting of surface of the burn with 1 in 1000 Flavine gives the best results.—A. J. Hull, B.M.J. ii./17,788.
'Paraffin No. 7 Modified' has been made using Spermaceti and Hard Paraffin *p. cq. vice* Hard Paraffin. The preparation melts at 49° C. and is filled into rubber-capped tubes for use at time of operation, after melting in the water bath.
Ambrine.—A similar preparation advised by B. de Sandfort (a compound of Paraffin with 5% Oleum Succini, L. i./17,318). Applied in similar manner.
Results better than those with Picric Acid. Pain alleviated, scar formation prevented. It has elastic and adherent properties.—B.M.J. ii./16,329,333.
Preparations similar to Ambrine used with advantage in eczema, varicose ulcers, neurodermatitis, intertrigo, fissures and chilblains. Paint on and

cover with thin layer of cotton wool, then a second film of paraffin, cotton wool and bandage. Relieves itching.—B.M.J.E. ii./21,1.

Of value in the after-treatment of ear operations.—B.M.J.E., ii /25,88.

Dental Wax. Hard Paraffin 1 ounce; Beeswax 6 ounces. melt together, add ½ ounce Alkanet and keep warm for two hours, then strain and add Tincture of Tolu 2 drachms, Otto of Rose 5 drops. Generally supplied in sheets 6½ by 3½ inches *Use.*—The sheet is warmed over the flame and moulded carefully over the model. It is used for mechanical purposes prior to vulcanisation.

Oleum Petrolei Flavum and **Huiles Lourdes de Petrole.** Heavy Petroleum Oils—products from American Petroleum Distilling between 280 and 400° C. Sp. Gr. 0·880 to 0·905. Used as a vehicle for **Hypodermic Injections.** For the suspension of insoluble mercurial salts, such as calomel, salicylate, succinimide, benzoate and yellow oxide of mercury, 1, 5, or 10% mixtures being employed.

Vaselinum Liquidum. *Syn.* **Huile de Vaseline, 'Vaseline Liquide'** FR. CX. is prepared from Caucasian Petroleum by purifying the fractions between 335° and 440° C. Sp. Gr. about 0·875 *i.e.* it approximates *Paraffinum Liquidum* in character. Employed in Huile Grise *q.v.*

Paraffinum Liquidum (*B.P.* '14).—*Syn.* OLEUM PETROLEI, PETROLATUM LIQUIDUM, U.S. CHRISMALINE, *Paroleine (T.M. 248370).

Dose.—2 to 4 drachms (8 to 15 Cc.).

A clear oily liquid obtained from petroleum after the more volatile portions have been removed by distillation. Sp. Gr. 0·860 to 0·890 (*B.P.* '14). For spraying as also for 'Toilet Paraffin' is preferred with gravity 0·865 to 0·870. *For internal use* 0·880 *to* 0·885 *is preferred.* Below 0·880 it is not suitable as an internal lubricant. U.S. has two varieties,—one termed Heavy, the other Light Liquid Petrolatum—with different viscosities.

A careful clinical comparison of treatment with low (130) viscosity Liquid Paraffin, Sp. Gr. 0·8718 and high (230) of Sp. Gr. 0·8902, showed that the latter had a slightly more laxative action and there was decidedly more tendency to leakage with the low viscosity oil. The highly viscous oil was more satisfactory in general. A standard of not less than 180 should be adopted.—H. B. Russell and P. C. Brett, L. i./23,594.

Samples which we have had examined had viscosities 281 and 290.

(We deal further with the question of viscosity in *Vol. II.*)

Russian Oil contains principally Saturated Hydrocarbons while **American** petroleum contains a large proportion of the unsaturated Olefines. The Baku Oils differ from Pennsylvania and other U.S. Oils in consisting largely of hydrocarbons of the Naphthene group. (Saturated single link *ring* compounds). American oils are best for chlorinating. *cf.* p. 53.

***Russolax** (Design Regtd., T.M. 370353), is distilled and refined in England. It has high viscosity (275 seconds at 100° F.).

Uses.—Liquid and Soft Paraffin are employed as electuaries or lubricants in constipation. Also of use for colitis in children internally. By its lubricating action taken regularly, it may avert appendicitis. It is a good catheter lubricant.

It is used as a basis for laryngeal and nasal spray solutions or pigments, containing menthol (1 in 8 or more), cocaine (soluble only 1%) or other medicaments. *Alkaloidal bases and their salts are in general only very slightly soluble in any of these liquid paraffins.* A little Oleic Acid added assists solution.

Enteric with constipation in Egypt well treated.—L.ii./14,231,421.

'PARAFFIN PAIN' from giving Liquid Paraffin as an intestinal lubricant may be due to poor viscosity, but may also be due to the time of giving the oil. The pain corresponds often to the hunger pain described in cases of duodenal ulcer. Give small doses, say 2 dr., and not immediately after food, or one dose of one ounce at bedtime, increasing gradually if necessary.—S. Samuel, Pres., Oct. '20.

Given as a lubricant Liquid Paraffin enters the cæcum mixed with the iliac contents and keeps the contents of the large bowel soft. In addition it accelerates the passage of the fæces through the large intestine which consequently does not become overloaded. The whole of the ingested Paraffin can be recovered from the stools,—there is no toxic action even with large amounts. Sir W. A. Lane was the first to popularise Paraffin for internal use.—J. W. Peck, P.J. i./14,28,508.

Liquid Paraffin cannot be regarded simply as a lubricant, since in cats (shown by fluoroscopic studies) it hastens the passage of the contrast meal through the intestines and visibly increases peristalsis.—P.J., ii./25,303. Its action on the bowel is not one of lubrication but is due to its ability to form emulsions, holding about 15% more water than usual in the stool.—Munch. Med. Woch, per P.J., ii./27,461.

Possible danger in internal use. It is 'officially' recognised as a cause of cancer in workers. Author states that in practically every case of malignant disease of the colon which has come to his notice the patient was in the habit of taking Liquid Paraffin for the relief of constipation. Suggests further investigation.—J. Burnet, Pres., Apl. 23, 138. Editorial comment not inclined to endorse the theory, *ibid.* 137.

Tumours due to Liquid Paraffin injections. Three cases of pseudo-tumour provoked by Liquid Paraffin injected as vehicle for chemicals like Camphor.—M.P.C., Oct. 25/22,343.

ECZEMA ANI consequent on the taking of Liquid Paraffin for chronic constipation.—R. Gibson, B.M.J., i./27,876.

Paraffin dressings found of great value for the relief of pain in herpes zoster; effective only during the eruptive period.—Howard Fox, per Pres., Feb. 23, 83.

In a case of recurrent generalised eczema madidans local use of Liquid Paraffin effective.—B.M.J. ii./13,1013.

WOUND DRESSING.—Medicinal paraffin good.—B.M.J. i./22,940. See also p. 658.

SCOTTISH SHALE OIL INDUSTRY—Dermatoses of paraffin workers.—Alexander Scott, B.M.J. ii./22,381.

Emulsio Petrolei cum Hypophosphitibus. *Martindale.*

Dose.—1 to 4 drachms (**4 to 15 Cc.**).

Some experiments conducted by us in 1907, with a view to making a satisfactory 50% Emulsion, gave the following as the best of a number tried.—Rub Powdered Gum Acacia (good) 4 ounces with Liquid Paraffin 8 ounces, Soft White Paraffin 2 ounces, Cinnamon Oil 24 minims. Then add in two portions a solution of Sodium and Calcium Hypophosphites of each 192 grains, Saccharin Elixir 90 minims in Water 10 ounces.

Equal parts of Liquid and Soft Paraffin produce a thicker emulsion.

Emulsio Paraffini cum Pancreatino.

Dose.—2 to 4 drachms (**8 to 15 Cc.**).

Liquor Pancreaticus 2 ounces included in this formula.

For the intestinal stasis of tuberculous children drachm doses of this preparation promote healthy function of the bowel.

Emulsio Paraffini et Bismuthi.

Dose.—One ounce (30 Cc.) first thing in the morning and at bedtime, followed by ⅔ tumblerful of moderately hot water.

Liquid Paraffin 1 ounce, Clove Oil 10 minims, Sodium Bicarbonate and Compound Tragacanth Powder of each 1 drachm. Emulsify with Chloroform Water ½ ounce, and Solution of Bismuth 1 drachm and add in portions Chloroform Water to 8 ounces.

The small dose of Bismuth is intentional. In some cases larger quantities may prove constipating.

The formula is varied to suit the case, *e.g.*, Peppermint Oil 10 minims may replace the Clove Oil, varying doses of Bismuth Salicylate, or Subgallate, may replace the Bismuth Solution, and where there is constipation Vinum Aloes or Compound Tincture of Aloes ½ ounce to 1½ ounces may be incorporated.

Catarrh of the alimentary tract is frequently responsible for toxæmia due to insufficient or impeded action of the liver and pancreas. This condition is often the cause of affections of the circulatory system (heart troubles, etc.), coupled with evidence of rheumatoid arthritis and of fibrositis.—W. Bezly Thorne.

Milk Casein as emulsifying agent for Paraffin Emulsions.—P.J. ii./13,208.

The following are flavoured preparations :—

Aperfine Liquid. *Dose.*—2 to 4 drachms (8 to 15 Cc.). Liquid Paraffin flavoured with oil of Lemon.

Aperfine. *Dose.*—2 to 4 drachms (8 to 15 Gm.) is similar but in paste form. It contains 70% of White Soft Paraffin.

These act purely physically, hence produce no evil effect or habit.

The following are some other Paraffin preparations on the market :

***Aperol** (T.M. 290001). **Delectol.** **Internol.** ***Petrojel** (T.M. 274384).

***Osacol** (T.M. 365487) **Jelly** contains 75% Russian Paraffin in a Malt Extract basis.

***Cristolax** (T.M. 435407). A compound of 50% liquid Paraffin with 50% Malt Extract in powder form. The Paraffin establishes bowel regularity and the Malt Extract improves the tone of the digestive process.

Fructolax. *Dose.*—2 to 3 drachms at bedtime. A lenitive and laxative containing about 80% soft Hydrocarbon with a fruit conserve. For internal use.

***Laxamel** (T.M 355661). *Dose.*—1 to 4 drachms (4 to 15 Cc.). A jelly containing 80% Paroleine.

***Maltaffin** (T.M. 355917).—A paraffin and malt preparation is described, p. 549.

Semprolin Emulsion.—For use as a lubricant to the alimentary and intestinal tract. Contains 60% Liquid Paraffin. Combinations with Bismuth and Pepsin, Glycerophosphates, Hypophosphites, Iron, Lecithin, Guaiacol, Malt, Salol, etc., are made. Semprolin Cream containing 90% Liquid Paraffin and Semprolin Carminative are also prepared.

Emulsio Paraffini cum Rhamno Frangula.

Dose.—½ to 1 ounce (15 to 30 Cc.)

Liquid Extract of Buckthorn Bark 1 ounce, Liquid Paraffin 4 ounces, Benzoic Acid 5 grains, Irish Moss Decoction to 8 ounces. A mild laxative.

***Paraffagar** (T.M. 355918).

A combination of Hydrocarbon Oil with Agar Agar in the form of a jelly as an efficient electuary, without weakening effects.

Dose.—1 to 2 drachms at bedtime. Children, ½ to 1 drachm increased if necessary.

Paraffagar with Phenolphthalein. *Dose.*—1 to 2 drachms, containing Phenolphthalein ½ grain in 1 drachm.

***Paraffagar Capsules.** *Dose.*—One or two at bedtime, increased if necessary. This is a very convenient preparation.

Confectio Petrolei K.C.H. *Syn.* LAXAR.

Dose.—1 to 2 drachms.

Agar Jelly 4%, 1 ounce, White Soft Paraffin 1 ounce, Peppermint Oil 2 minims, Cassia Oil 2 minims, Saccharin ½ grain.

Emulsio Paraffini Liquidi cum Agar Agar (50% Paraffin and 0·8% Agar Agar).

Dose.—½ to 1 ounce or less if requisite morning and evening. Children 1 to 2 drachms.

We have conducted a number of experiments to provide a satisfactory formula. The following, worked out in the author's Laboratory (1927), gives a good result:

Dissolve Agar Agar 0·8 in Water 46 and strain hot into the following, mixed:—Gum Acacia 2·1, Tragacanth 0·3, Sodium Benzoate 0·2, Liquid Paraffin 50, the last ingredient being made sufficiently hot. Stir vigorously until cold. Finally incorporate Saccharin Elixir 0·5, Vanillin Solution 0·1, Lemon Oil 0·1.

Emulsio Paraffini Liquidi cum Agar Agar et Phenolphthalein.

Dose.—½ to 1 ounce or less if requisite morning and evening. Children 1 to 2 drachms.

The formula is as above, incorporating *secundum artem* Phenolphthalein 1 grain per ounce dose.

The formulæ given P.J. i./26,192; ii./26,412, and ii./27,108, were tried and found unsatisfactory, even with the addition of wax. Our experiments show that the wax makes a preparation which separates in a micro-crystalline condition.

Liquid Paraffagar and **Liquid Paraffagar with Phenolphthalein** are available in commerce.

Ⓟ**Paraffinum Compositum Liquidum.** CAN. FORM.

Mix the following intimately, to make a homogeneous liquid. Camphor 3·4, Menthol 1·0, Thymol 0·5, Eucalyptol 1·0, Oil of Wintergreen 3·4, Hydrastine 0·015, and Liquid Paraffin a sufficiency to make 1,000. Is suitable for use as an antiseptic and astringent 'Nebula.'

Nasal passages and throat should be kept clean with a simple oily preparation, *e.g.*, Liquid Paraffin, as they are frequently the paths of infection, for pneumonia, rheumatic fever, influenza and diphtheria, also for cerebro-spinal fever and poliomyelitis.—Sir James Barr.

Capsules (Gelatin) with pointed ends of **Sterile Liquid Paraffin** are made for lubricating catheters, &c.; they contain 30 minims.

Wound Dressing with Liquid Paraffin.

At one stage in the war there was enthusiasm for 'Oil' as a wound dressing for uncomplicated wounds.

Casualty Clearing Station results show success with Liquid Paraffin preparations. Gauze used for packing a wound smeared with a Paraffin Paste should be wrung out of Liquid Paraffin or Iodoform-Paraffin 1%.—Col. H. M. W. Gray, B.M.J. ii./17,509. *See also* Iodine in Paraffin.

Gauze soaked in paraffin for wounds.—J. Campbell, L. ii./18,477,495.

Creosoted Oil. (Calot's formula). Liquid Paraffin 70 Gm., sterilised by boiling for ½ hour. Allow to cool and add in order (1) Creosote 5 Gm., (2) Guaiacol 1 Gm., (3) Iodoform (sterile) 10 Gm., (4) Ether 30 Gm.

Used as a wound dressing.

Injection of 10 Cc. weekly of Calot's fluid with ***Olive Oil*** in place of Liquid Paraffin of distinct value following aspiration of cold abscesses and in treatment of white swellings of joints. **Calot's No. 2 Paste:**—Phenol Camphor 3 Gm., Naphthol Camphor 3 Gm., Guaiacol 8 Gm., Iodoform 10 Gm., Lanolin 150 Gm., Spermaceti 100 Gm., of value for injection in sinus formation in disease of hip, spine and knee. 10 Cc. injected into sinus at temperature of 103° repeated every fourth day for 10 occasions. Albuminuria and septic infections causing pyrexia contraindications.—R. Pollock, L. i./27,225.

The various **Lubricating** and **Lighting Oils,** *e.g.* **Kerosene**-fractions between 120° and 133° C., and **Mineral Naphtha** (to be distinguished from Solvent Naphtha *q.v.*), are the next fractions, and are mentioned here to render the series more complete.

(NOTE.—During the war and probably since—the benzol, toluol and xylol fractions were removed from mineral naphtha in great measure thus producing a liquid with much higher boiling point.—Abel Scholar C.D.).

Lefroy's Crude Mineral Oil Emulsion. *Syn.* **Petroleum Insecticide.**

Crude Mineral Oil (Kerosene) 110, Soft Soap 50 (whale oil soap is specified) with about 10 of water to form a jelly. For use against lice, fleas, flies, etc.—both destroying them, preventing their further attack and thereby acting as a prophylactic to many forms of infectious disease—typhus, typhoid, diphtheria, diarrhœa, dysentery, consumption, etc. It is used like ordinary soap for washing. If a little be allowed to dry into the clothes vermin will not approach. The same effect is secured by rubbing a little over the skin.—H. Maxwell-Lefroy, L. i./15,1150

✻**Vermijelli** (T.M. 365780). A preparation originally devised for spraying plants after dilution. The following is similar:—Whale Oil Soap 160, Crude Petroleum 110, Naphthalene 4.—H. M. Lefroy, B.M.J. i./15,317. In conjunction with 'N.C.I.' (*q.v.*), was used in the war.

Favus has been cured by soaking with Petroleum of commerce.

Huile de Petrole, FR. CX. has Sp. Gr. 0·800 distilling between 130° and 180° C. from American Petroleum. Flash point not below 35°.

'Petrol,' *Syn.* GASOLINE, 'MOTOR SPIRIT.'

Wounds, swabbing out with Petrol gave good results.—M. H. Embree, B.M.J. ii./16,327.

Of great value for cleaning cuts, abrasions, septic wounds and burns; also in the early stages of diphtheria and similar diseases—by swabbing the nasopharynx with lint soaked in petrol it is possible to cut the disease down to a minimum.—G. A. Stephens, Pres., April '23,140.

Petrol Poisoning resembles drunkenness. Treatment: little to be done beyond placing patient in fresh air and keeping him warm.—B.M.J i./15,769.

Antidote.—Camphor Injections and Oxygen may be tried.

Tetra-Ethyl Lead.

A very active and dangerous poison, far more so than any inorganic Lead compound—only a few mgr. a day will cause cumulative poisoning. In the works of the Standard Oil Co., New Jersey, 5 employees died and 30 others were affected. For treatment large quantities of alkalis recommended.—B.M.J., i./28,61,64,75. Further investigation necessary.—*ibid.* 363,366.

In a family car using 107 galls. of Ethyl Petrol (3·5 Gm. Lead to the gall.) 75% of the lead went into the air and the rest into the car parts.—*Daily Mail*, April 13, 1928.

For further details of Motor Spirits, see Vol. II.

Petroleum Benzine or **Benzoline** is the fraction between 60° and 0° C. This is used for cleaning purposes. Distinguished from Benzene (Benzol), the product obtained from Coal Tar, *q.v.*

Petroleum Spirit. *Syn.* PETROLEUM ETHER **used for heating cauteries.** Has Sp. Gr. 0·67 to 0·7, and distils over below 60° C. $C_5H_{12}=72·096$ principally.

Benzinum Purificatum U.S. is Purified Petroleum Benzine with Sp. Gr. 0·634 to 0·660 at 25° C. and B. pt. 35 to 80° C.

Benzine (preferably spelt Benzin) means Petroleum Benzin.

Petroleinum, P. Belg. and **P. Jap.** have Sp. Gr. 0·64 to 0·67 with B. pt. 50° to 75° C. FR. CX. has with *Syn.* **Gazoline,** Sp. Gr. 0·65 to 0·67, and to distil over entirely below 85° C. **Ligroin** is a very similar product.

Petroleum Spirit.—With Sp. Gr. 0·640 contains always a large fraction boiling below 40° C., and with Sp. Gr. 0·700 contains a large amount distilling above 60° C.—Tyrer and Gosling, P.J. ii./12,157.

Pétrole léger. FR. CX. has Sp. Gr. about 0·6, and distils entirely below 50° C.

Amyl Hydride. *Syn.* PENTYL HYDRIDE; PENTYLENE; HYDRAMYL. Mainly $C_5H_{12}=72·096$. Obtained by the fractional distillation of Petroleum Spirit. Sp. Gr. 0·625 to 0·649, boiling point about 30° C. It is very inflammable; applied locally, is not absorbed, but rapidly freezes the part by evaporation. **Rhigolene** is similar.

Oleogen contains Oleic Acid, Yellow Petroleum Oil, with a proportion of Ammonia. A clear yellow oily preparation. Sp. Gr. 0·91. It is miscible with Chloroform in all proportions.

Medicated Oleogens of the following are prepared:

Camphor, 30% Rubefacient. **Guaiacol,** 20% Antituberculous. **Ichthyol,** 10% Antiseptic. **Iodine,** 5 and 10% Antisyphilitic. In tinnitus aurium should prove of value—a few drops to be rubbed extensively behind the ear night and morning. **Menthol,** 2% Rubefacient. Antineuralgic. **Salicylic,** 10%, Antirheumatic.

Lotio Paraffini Composita.

Soft Paraffin 3 ounces, Balsam of Peru 2 drachms, Mercuric Oleate 60 grains, Olive Oil 1½ ounces. To be applied with a stiff brush. For parasitic skin diseases.

PELLETIERINA.

$C_8H_{15}NO=141·128.$

Dose.—2 to 6 grains (**0·12 to 0·4 Gm.**).

A mixture of alkaloids obtained from pomegranate stem and root bark, *Punica Granatum* (B.P. 1898), ('Granatum' U.S.) (*Lythraceæ*), in minute shining white crystals. The alkaloids are at least four in number, their amount varies between 0·5 and 0·7%. In addition 20% Tannin. Granati Cortex (Root Bark). P. ITAL. has *Syn. Melograno.*

Fluidextractum Granati, U.S.

Average dose.—30 minims (2 **Cc.**). 1=1. A glycero-hydroalcoholic extractive.

Pelletierine is β-2-piperidyl propaldehyde or in other words the aldehyde of Coniine. Though a secondary base it does not react with Nitrous Acid. The alkaloids of Pomegranate root seem to be entirely racemic though originally believed to be optically active.—Hess & Eichel, Ber., 1917.

Pelletierinæ Sulphas, Punicine Sulphate. (FR. CX.).
$(C_8H_{15}NO)_2H_2SO_4$=380·336.

Dose.—2 to 8 grains (**0·12 to 0·5 Gm.**).

A brown syrupy liquid, freely soluble in water, sometimes as crystalline mass. As a remedy for tape-worm: 5 to 8 grains taken fasting, followed by a full dose of compound tincture of jalap; for 13 years, half the above dose, and for infants one-tenth.

FR. CX. provides complete method of manufacture from the pomegranate root bark. In the final stage of extraction the combined pelletierine and isopelletierine are present as sulphates in aqueous solution which on slow evaporation yield a 'crystalline residue' of the two salts. The mixture is called 'Pelletierine Sulphate' for short. The dose is usually **0·3 Gm.** with **0·4 Gm.** of Tannin and **2·5 Gm.** of Syrup Max. single dose is **0·4 Gm.**

Pelletierinæ Tannas (B.P. '14).

Dose.—2 to 8 grains (**0·12 to 0·5 Gm.**).

A mixture of the Tannates of the Alkaloids in greyish powder only slightly soluble in water, but soluble about 1 in 80 of alcohol 90%. As a tæniafuge, 8 grains followed in 2 hours by an ounce of castor oil proved an effectual dose, causing neither colic nor headache.

The **Hydrobromide** with same dose is a brownish viscid liquid.

Granati Cortex.

Better results in tapeworm by passing into duodenum by Einhorn's catheter. 150 Gm. of powdered root bark infused for 12 hours in a litre of water, and boiled down to one half. Before use, warm to 100° F. and give three doses of 65 Cc., at half-hour intervals, followed by laxative, after which catheter is withdrawn. Only two failures in 19 cases.—L. ii./26,1354.

PEPSINUM.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**) either with or immediately before or after meals, in a pill or cachet. It is not unpalatable sprinkled on meat like pepper.

The gastric juice of man is believed to contain several distinct digestive ferments, the chief being :—

a. Pepsin. This changes protein (fibrin, albumen, &c.) into peptones in an acid medium, 0·2% of Hydrochloric Acid being the most advantageous. To this the medicinal pepsins owe their activity

b. Curdling ferment, which curdles the casein of milk; this is very active in the stomach of the calf, and will permit of its being dried; it is contained in the preparations of rennet preserved with salt, known as :—

Essence of Rennet. *Syn.* **Liquor Seriparus,** LIQUID RENNET.

Dissolve Sodium Chloride 40 in water 810, add Alcohol 190 and macerate Rennet (calf's stomach) 100 in the mixture for three days with frequent agitation, then filter.—N.F. Ph. Form. gives three other formulæ—one with Glycerin and Boric Acid as preservatives.

Rennet can clot 400,000 times its weight of Casein in Milk.—C.D. '19, 543.

Rennin. Rennet Ferment in powder form. One grain dissolved in about ½ ounce of water will in an hour or two curdle a pint of milk under ordinary conditions. (To be kept at blood heat.)

Rennet Tablets are prepared and are of considerable convenience. One will curdle a quart of milk.

Pepsin may be used in cheese-making instead of rennet. It is impossible to detect any difference between cheese made with pepsin and that made with rennet. The pepsin solution is:

Sodium Chloride 2 lbs., Boric Acid 3 ozs., Water 1 gallon.

Dissolve by boiling, then cool to 104° F., and add Pepsin 13½ ozs.—C.D. ii./17,761.

Pepsin is a light yellowish brown or white powder, or in translucent grains or scales, prepared by drying under 100° F. the fresh mucous lining of the stomach of the pig, sheep, or calf. It has a faint, not disagreeable odour, is moderately soluble in water. Rubbed with water, it makes a glairy mixture. Pepsina Porci is generally preferred. Pepsin is supplied to dissolve 2,500 (*B.P.* '14), 3,000 (U.S.), and 5,000 times its weight of freshly coagulated and integrated white of egg.

For various other Assay methods see Vol. II.

Incompatibility according to our experiments, depends to a great extent on concentration of the diluent fluid. A *small* quantity of electrolyte seems essential to enzyme action. Salts present *in quantity* hinder the enzyme. The following if present in strong proportion *prevent action*:—

Alcohol,
Alkalis,
Alum,
Copper Sulphate,
Extract of Malt,
Magnesium Sulphate,
Paraldehyde,
Potassium Salts (Chloride, Bromide, Iodide),
Sodium Chloride,
Hexamethylenetetramine.

Further details, see Vol. II.

Asbestos, as also Aluminium Hydroxide, has the power of removing Pepsin and other ferments from solutions. *cf.*, p. 144.

Flavoring.–Syl Lavandulæ, Syl Coriandri, or as Elixir Pepticus.

Soluble and Insoluble Pepsins (Commercial).

Insoluble Pepsins are of two kinds, one precipitated by salt, and one made directly from the selected membranes without digestion, but purified by washing in spirit. These require a small quantity of Hydrochloric Acid to effect solution in water.

Soluble Pepsin is made by self-digestion of the membranes and subsequent dialysis of the resulting Peptone, thus leaving the peptic power in a soluble and more isolated form. It is then dried on glass plates, being sold in scale or powder form.

In sprue and hill diarrhœa, Pepsin has given good results.

In vomiting due to utero-gestation, pepsin in dose of 7 to 8 grains has been advocated as of service.—Yeo.

Pepsin and Hydrochloric Acid given immediately after eating will inhibit carbohydrate digestion in the stomach. It should not be taken until from 30 to 45 minutes after eating.—Prof. Diner, Jl. A.M.A., per Pres., Feb. '20.

Glycerinum Pepsini (*B.P.* '14).

Dose.—1 to 2 drachms (**4 to 8 Cc.**) in water.

A solution of Pepsin 8% strength in Acidulated Glycerin and water. This is a very active solution. If made with good scale Pepsin keeps indefinitely.

Contused wounds if sloughing is suspected should, it has been suggested, be treated with Glycerin of Pepsin.

Elixir Pepticus. *Dose.*—½ ounce after each meal.

Glycerin of Pepsin 8, Dilute Hydrochloric Acid 1, Aromatic Syrup to 32.

Liquor Pepticus (Benger's).

Dose.—1 to 2 drachms (**4 to 8 Cc.**) in a wineglassful of water with meals. An active solution of the ferments in weak alcohol.

Liquor Pepsini et Caffeinæ. *Martindale.*

Dose.—2 to 4 drachms in water after meals.

The above dose contains 5 to 10 grains of Pepsin with 1 to 2 grains of Caffeine. As a digestive and restorative. The presence of Caffeine is stated to increase the activity of Pepsin.

Ⓟ**Elixir Pepsini Bismuthi et Strychninæ.**

Dose.—1 drachm (=Pepsin $\frac{1}{2}$ grain, Bismuth and Sodium Tartrate 2 grains, Strychnine $\frac{1}{64}$ grain).

Dissolve Scale Pepsin 64 grains in Glycerin 1 ounce, Water 1 ounce, mixed. Dissolve separately Strychnine 2 grains in Tartaric Acid 2 grains, Water 3 ounces and add Glycerin 1 ounce. Then mix with Glycerole of Bismuth and Sodium Tartrate 2 ounces, and add Aromatic Elixir 8 ounces, and Caramel 4 drops. Finally, pour the Pepsin Solution first prepared into the other liquid. To prepare the **Glycerole of Bismuth and Sodium Tartrate,** dissolve Bismuth Subnitrate 1,142 grains in Nitric Acid 19 drachms, previously diluted with Water 10 drachms. Then add in parts, Water 16 ounces. Add Tartaric Acid 860 grains, and then gradually Sodium Bicarbonate 977 grains, Dilute the Bismuth Tartrate formed with Water 32 ounces. Allow to deposit, and wash repeatedly until free from Nitric Acid. Mix Sodium Bicarbonate 977 grains with Water 5 ounces, and add cautiously Tartaric Acid 860 grains, warming slightly to dissolve. Dissolve the Bismuth precipitate in this Solution, add Glycerin 8 ounces. Evaporate or dilute with Water if necessary to 16 ounces. Each drachm contains 16 grains of Bismuth and Sodium Tartrate with excess of Sodium Tartrate.—Caspari. Looks better coloured pink.

Tabellæ Pepsini. *Dose.*—1 or 2 just before or with meals.

These have 3 grains of pepsin in each in combination with chocolate, they are palatable—a handy form of providing the digestive.

Tabellæ Pepsini et Bismuthi. *Dose.*—1 or 2 just before or with meals,—contain 3 grains bismuth oxynitrate added to the above.

Tablets of Pepsin, compressed, 3 grains (0·2 Gm.).

Tabellæ Pepsini et Caffeinæ.

Contain 3 grains Pepsin with 2 grains Caffeine. *Dose.*—1 to 2 after a meal. Digestive and tonic.

P1 **Tabellæ Pepsini et Strychninæ.** *Dose.*—1 or 2 after a meal. Contain Pepsin, 2 grains, with Strychnine Hydrochloride $\frac{1}{100}$ grain.

Vinum Pepsinæ.

Dose.—1 to 2 drachms with meals.

Pepsin 3, Diluted Hydrochloric Acid 3, Sherry to 60.

NOTE.—For sale without a Wine Licence in the United Kingdom Pepsin Wines must contain 1 of Hydrochloric Acid (B.P.) in 80 of the total product.

Extractum Gastricum.

Dose.—1 to 2 drachms diluted with a little cold water.

An extract of the entire mucosa of the stomach, including the pyloric. It presents the peptic enzymes—proteolytic and milk-curdling and other soluble organic and inorganic constituents. It contains approx. 0·25% Hydrochloric Acid, loosely combined with protein, and 25% Glycerin as preservative.

PEPTONE.

A whitish readily soluble powder, prepared from meat (the proteins and albuminoids), peptonised either by acidulation and heat under pressure, or by artificial digestion with pepsin or trypsin, and freed from saline matter. Certain types of peptone have been extensively used in bronchial asthma by the process of immunisation with non-specific protein, *vide infra.*

Peptonised Beef.

A chocolate-coloured paste, having a bitter taste and the odour of extract of beef; prepared by artificially digesting beef by means of acidified fresh gastric juice and concentrating the solution. It is sometimes added to beef tea, but is too unpleasantly bitter to be readily taken by patients. Enemata, *v. infra.*

Peptone F.E. is manufactured by digesting 1 kilo of beef with 10 litres of water (containing 4 Gm. of hydrochloric acid per litre) with pepsin 10 Gm. for 8 hours at 50° with frequent shaking. Termination of reaction shown by absence of precipitate with nitric acid on adding to a little of the filtered liquid. Evaporate. 1 kilo yields 250 Gm. approximately.

Peptonoids of Beef.

Lean Beef, finely minced, 8 ounces, Pancreatin 60 grains, Sodium Bicarbonate 60 grains, Water 1 pint. Digest 3 hours at 130° F. with constant stirring; neutralise with hydrochloric acid, boil, strain and press. As enema 1 ounce with normal saline 3 ounces, *p.r.n.*

The proprietary article, ✱ **Carnrick's Liquid Peptonoids** (T.M. 479927 and 29585)—'Beef, Milk and Wheat' is a predigested food. *Dose.*—½ tablespoonful at intervals. May be dispensed by registered chemists without requiring a spirit licence to be taken out, providing it forms a constituent of a *bona-fide* medical prescription given by a duly qualified medical practitioner. Also applies to **Panopepton.**—P.J. i./11,568.

Beef Peptone with Malt.

Dose.—2 to 4 drachms. A palatable nutrient.

PROTEIN THERAPY.

(IMMUNISATION IN BRONCHIAL ASTHMA AND ALLIED AFFECTIONS).

Skin Reactions.

It is thought possible to determine by skin reactions whether an asthmatic is sensitive to divers vegetable and animal proteins, and the subsequent treatment is by (1) segregating him from the offending protein, or (2) 'desensitising' him with gradually increasing doses of 'non-specific' protein. The pioneer in exploiting the Cutaneous Tests was, we believe, I. C. Walker.

Out of Walker's 400 cases 191, or 48%, gave a + skin reaction.—I. C. Walker's papers, Arch. Int. Med. Chicago, 1918, XXII., 466; Boston Med. and Surg. Jl., 1918, CLXXIX., 288, Arch. Int. Med. Chicago, 1919, XXIII., 220; Jl. Med. Res., 1920, XLI., 457–466. For an extensive bibliography on the subject *v.* opening paper, "Discussion on Asthma and Allied Disorders," by Sir Humphrey Rolleston.—B.M.J. ii./21,235.

Skin Test Solutions.

Various workers speak of making the Test Solutions by 'Solution' in N/10 Sodium Hydrate—*i.e.*, maceration of the protein preparation for a period of time in the alkali. Solutions supplied for the purpose, which we examined, appear to be *without* this alkaline solvent—*i.e.*, they are made by macerating the protein in water or saline and further they contained no preservative.

Personally, we advise solutions should be made with extreme care and they should contain 0·5% Trikresol with controls of a similar composition.

It is of convenience to arrange the various Test Solutions in closely related groups, *e.g.* :—

Animal Proteins :—Various meats (beef, mutton, veal, chicken, game), fish, egg and milk.

Furs and Feathers : Horse, dog, cat, sheep, rabbit, chicken, goose, etc.

Cereals :—Wheat, barley, oats, rice.

Fruits :—Various.

Vegetables :—Various (potatoes, cabbage, etc.).

Bacterial :—B. Coli, etc.

Pollens :—These, for use in Great Britain, should be of typical indigenous British grasses and trees. It appears to us unscientific to employ preparations of pollens from plants indigenous abroad. These are unlikely to be the cause of hay fever or kindred affections in this country. (It is stated that grass pollens are similar in effect while the pollen of "flowers" differ—*vide infra.*)

Technique of Applying Skin Tests.

Cleanse the skin on the inner side of the forearm with Alcohol or Ether and place a small drop of an alkaline solution of the group protein upon it. With a knife or needle scratch sufficiently to break the skin surface without producing bleeding. Do the same on another place on the forearm, using a drop of control fluid. A + reaction shows in a few seconds by a zone of hyperæmia spreading outwards—followed in 20 to 30 minutes by the production of a definite urticarial wheal, of at least ¼ inch in diameter with little or no effect at the control.

Protein Test Papers.—In use moisten and apply to the skin.—E. A. Cockayne, Clin. Jl. Jan. '24/23,38.

Remarks on Diagnostic value of the test.

Hay fever in U.S.A. is attributed to **Ragweed** (**Ragwort**) and pollens.—I. C. Walker, Jl. A.M.A., Sept. 20/782.

Asthma, hay fever, urticaria, angio-neurotic œdema, may be classed in the group of toxic idiopathies.

Hypersensitiveness may possibly be acquired, *e.g.*, by constant contact, as in bakers with flour proteins but it is improbable that the condition arises *de novo* from absorption of foreign protein *via* the subcutaneous tissues or a damaged mucous membrane.

The value of positive skin tests in diagnosis of hypersensitiveness to protein is shown by success of treatment—desensitisation by njection of the offending protein, avoidance of a food protein, or vaccines—based on the information provided. On non-specific ines the treatment is by intramuscular or intravenous peptone.—Sir H. Rolleston, L. ii./21,281 ; B.M.J. ii./21,233.

In the majority of asthmatics the trouble is due to inhalation of dandruff from fur, feather or hair of domestic animals. A useful discussion of the entire subject.—F. Coke, B.M.J. i./21,372 and 615. See also J. Freeman, Pr., Jan. '26,73.

In many cases of asthma the patient was found to give reactions to one or more groups. The largest proportion of cases reacting to these skin tests were found to be sensitive to pollens. In the animal group of proteins feathers appear to be the most prominent. —Mackenzie Wallis, B.M.J. ii./21,796.

This tendency to develop toxic symptoms is markedly hereditary. Idiosyncrasy towards more than one substance is the rule—possibly not dependent on anaphylaxis.—H. W. Barber, B.M.J. ii./21,554.

Positive skin tests for hypersensitiveness, discussion as to value of. Not more than 50% of all cases give it. 130 test substances used at New York hospital. In asthma cases giving a negative protein cuti-reaction, bacteria play a prominent part. In skin tests the grass pollen reactions are greater than those of food proteins. Any *grass* pollen can be used for the test but the pollen of each kind of flower is different. Some cases of epilepsy give a definite + protein skin test.—J. Freeman, Mackenzie Wallis, Frank Coke (**Histamine** may possibly be concerned in production of asthma), A. E. Gow, and others, B.M.J. ii./21,196.

With a protein to which the patient is very sensitive, the blush from the original injury to the skin does not fade, but gradually spreads and deepens, and begins to irritate and smart. At other times, the wheal is almost absent and a large area of redness is the chief sign of the reaction. This is only of value when the control or other tests give no reaction at all. It may be delayed for 4 or even 7 hours. Analysis of 270 cases showing proportion of sensitiveness to horse, cat, dog, 'other animals,' hen-feathers, food, bacteria, and pollens. When the offending protein is found, alteration of diet is needed. It may be found, *e.g.*, that hard boiled egg can be taken when light boiled would be rank poison, or a process of desensitisation can be initiated.—A. Latham and F. Coke, Pr., ii./22,121.

For Skin Tests in Epilepsy see p. 672.

80% of asthmatics found to suffer from some form of **Allergy.** Common moulds, *e.g.*, *Aspergillus fumigatus*, and others abundant in moist and damp houses, form allergens to which 50% of asthmatics are sensitive. Skin reactions are obtained. 1 in 1,000,000 dilutions often have decided therapeutic effect. Allergen-free chambers used in treatment.—W. Storm van Leeuwen, B.M.J., ii./27,344. While van Leeuwen finds that *A. fumigatus* which flourishes extensively in Kapok is one of the chief causes of asthma in Holland where most mattresses are stuffed with the material, F. Coke advises its use in pillows to replace feathers.—Leader, *ibid.*, 355. Strong support for van Leeuwen's work.—D. Kennedy, *ibid.*, 517.

If a patient is sensitive to feathers alone he will be relieved of his asthma if put on **Kapok Bedding.** The house dust of patients' own houses used for desensitising patients. Reactions with proteins are extraordinarily specific. —F. Coke, B.M.J., ii./27,517.

Cutaneous tests with various proteins—wheat, milk, egg, vegetables, etc., also proteins of Staphylococcus albus, aureus and citreus. Especially useful in urticaria and eczema. Desensitisation sometimes possible.—B.M.J.E. i./21,96.

About one-fifth of non-asthmatic subjects are sensitised to one or more of the substances which are generally regarded as liable to give rise to asthma. —Sabatini, B.M.J.E. ii./21,17.

Among diseases other than hay fever, 100 cases showed positive results to some form of protein, but in only 13 of these was the finding of the test to food or animal protein really of use in further treatment; still, it was useful.—Rackemann, Am. Jl. Med. Sci., Jan, 22nd, per B.M.J.E. i./22,33.

Skin reaction helpful. A patient, emaciated and profoundly depressed, highly sensitive to cereals, had same removed from his diet, with the dramatic result of 16 lbs. gain in weight in a month.—W. Langdon Brown, B.M.J. ii./22,758. See also F. Coke, *ibid.* 760.

Only occasionally do asthmatics show sensitiveness to one particular protein, and for this reason the skin test is only reliable in some 2 to 3% of cases. —W. Langdon Brown, B.M.J., ii./25,205.

Some commercial test proteins were found to be inert. Useful results unlikely to be obtained unless there is some suspected idiosyncrasy. Even when demonstrated it does not invariably follow that the substance giving the dermal test causes a pathologic reaction, or that withholding it gives immunity from asthma. The preparation of some proteins is described.—F. G. Chandler, L. i./25,1177.

Asthma in childhood.—Of 50 patients, 40 were child asthmatics. Nine were positive to pollens, one to dog, one to cat and one to bacon.—A. Dingwall Fordyce, L.i./23,175.

The abstracts under Sensitisation in Asthma should also be consulted.

Peptone Immunisation in Bronchial Asthma.

The treatment of bronchial asthma by immunisation with small graded doses of Peptone has been employed with success.

To A. G. Auld is due the credit of introducing (in 1917) this method of 'NON-SPECIFIC PROTEIN THERAPY.'—B.M.J. i./17,580; ii./18, 49; i./20,567; i./21,696; i./22,835; i./25,448,762; ii./26,732; i./27,829; L. i./23,790.

Though Peptone acts as a non-specific desensitiser, it is by no means certain that a protein to which the patient is sensitive always acts specifically and not in the same manner as Peptone. In this method it is unnecessary to find the protein that is the antigen.

A satisfactory immunising process is characterised by a slight leucocytosis, particularly *re* the large mononuclears, and by increase in haemoglobin and red cells.—A. G. Auld, B.M.J. i./22,835.

To test a Peptone as to suitability for clinical use.

(*a*) Add an equal volume of saturated aqueous Ammonium Sulphate Solution to a 10% solution of the Peptone and stir with a glass rod. If satisfactory, a sticky precipitate, which adheres to the rod, comes down.

(*b*) Add to a few Cc. of a solution, in a test tube, two or three drops of strong Nitric Acid. A copious white precipitate is immediately produced, consisting of primary proteoses. On heating, the precipitate entirely dissolves, and re-appears on cooling.

General Indications for the Method.

The treatment has been applied not only to asthma, but also to such of its congeners as hay fever, associated skin affections, angioneurotic œdema, cyclic vomiting, periodic diarrhœa, and the migraine-epilepsy syndrome; in short, to such conditions as exhibit an anaphylactic character or sensitisation.

Contraindications.

Speaking quite generally, although a very large group of cases responds satisfactorily, other cases are to some extent resistant, and it should be noted that in bedridden, chronic cases the condition of the blood may be such as to render the treatment contra-indicated.

Cases resisting treatment:—

Many of those with chronic bronchitis and developed emphysema, and cases presenting any degree of cyanosis, even without bronchitis; also those in whom, apart from asthmatical paroxysms, a more or less oppressed condition of the respiration is practically never absent.

Where there is a family history of asthma from childhood one may get benefit for two or three weeks and then bitter disappointment. In such, a mildly toxic dose has to be given. In difficult cases a mixture of Peptones sometimes succeeds best.—A. G. Auld, B.M.J. i./20,568. *See also Serum Peptone, p.* 669.

Technique.

According to Auld, two distinct procedures have been evolved: (1) *Intravenous*; (2) *Intramuscular.*

(1) *Intravenous Treatment.*

A 5% solution of Peptone, of a special type, is employed. Extreme care is taken (*a*) to prevent the delicate albumoses being decomposed by exposure to excessive heat; (*b*) to neutralise the solution with Sodium Carbonate; (*c*) to determine by cultivation experiments that the solution is sterile at the time of use. Bacterial contamination may be followed by the *gravest* consequences. The solution is in effect a culture medium for bacteria in the event of chance contamination in manufacture.

The writer has prepared a series of ten

Peptone Sterules for Intravenous use, to comply with these requirements, of the following doses:—

First Dose	0·3 Cc.	(5 minims).	Sixth Dose	1·3 Cc.	(20 minims).
Second ,,	0·5 ,,	(8 ,,)	Seventh ,,	1·5 ,,	(25 ,,)
Third ,,	0·7 ,,	(11 ,,)	Eighth to Tenth ,,	1·5 ,,	(25 ,,)
Fourth ,,	0·9 ,,	(13½ ,,)			
Fifth ,,	1·1 ,,	(17½ ,,)			

Continuation Course (Intravenous) of Peptone Sterules.

In addition to the above, a set of six doses is arranged as follows:—Three doses each of 2 Cc. (30 minims) and 2·5 Cc. (40 minims).

The injection is given *slowly intravenously* in the arm, no after dressing being necessary. The doses are administered every fourth or fifth day. The dose must be varied in certain cases.

Shading-off Courses (Intravenous).

In a recent paper A. G. Auld (B.M.J. i./25,448) brings together further experiences. He states the procedure is safe. He has not had a case of accident in thousands of injections.

Writing concerning the intravenous technique, he advises dosage up to the tenth dose as hitherto, and he points out that after the tenth dose types of cases are broadly divisible into three classes. In one class the patient is quite well, and usually expresses surprise at his condition; in another he is much better, but not yet quite well; and in a third he may be but little better.

In the *first* class, two additional doses of 2 Cc., approx. may be given and then there is a shading off to complete the treatment with the following weekly dosage: 1·5 Cc., 1·2 Cc., 1·0 Cc., and 0·6 Cc. This completes the course.

In the *second*, if the patient is standing the Peptone well, the dose may be increased to 2 Cc. and 2·5 Cc., employing the **Continuation Course.** Then there is a *weekly* reduction to complete the treatment, namely, with a dosage of 2·2 Cc., 1·5 Cc., and 0·9 Cc. If, however, during the treatment the patient as an attack of asthma, reduce the dose considerably, say, to 1·5 Cc. Con-inue with this for two or three weeks and then reduce to 1 or 0·6 Cc.

In the *third* type of case Auld advises that Peptone, dissolved in the serum rom the patient's blood, be injected intravenously. *Vide Serum-Peptone.*

Shading-Off Courses for **Class I.** are arranged of six Sterules, containing 2 Cc., 1·5 Cc., 1·2 Cc., 1·0 Cc., 1·0 Cc., 0·6 Cc., and **Class II.**, containing three Sterules, 2·2 Cc., 1·5 Cc., 0·9 Cc., are prepared.

(2) *Intramuscular Treatment.*

A 7·5% solution of the same type of Peptone is used, prepared with the same precautions.

Peptone Sterules for Intramuscular use are made of 7½% strength in the same range of ten doses (0·3 to 1·5 Cc.) as also a **Continuation Course (Intramuscular)** of six doses, three of 2 Cc. and three of 2·5 Cc.

Dosage for children.—The 7½% solution is also used intramuscularly commencing with 0·3 Cc. (5 minims).

The evidence is that the intramuscular technique is as efficacious as the intravenous in the majority of adult cases. It has the advantage of being less of a 'surgical operation.'

Adrenalin which is acknowledged of utility in asthma has been used satisfactorily in conjunction with the Peptone treatment.

AULD'S METHOD OF MAKING THE INJECTION.—Dissolve the Peptone in Normal Saline at 56° C. Neutralise to Litmus by adding N/1 or N/2 Sodium Hydrate or Carbonate. Place the solution in the water bath at 56° C. for ¼ hour. Filter and add 0·5% Phenol. Bottle with rubber caps. Wait three days and then inoculate an agar slope and incubate at 37° C. for 16 hours. If result is negative, it is suitable for use.—A. G. Auld, B.M.J. i./21,696.

Serum Peptone.

The intravenous injection of Peptone dissolved in a serum obtained from the patient has given good results in cases where Peptone alone proved unsatisfactory.

For the preparation of the injection the 2 or 3 ounces of blood is run into a sterile 4-ounce glass tube, and allowed to stand corked, at room temperature till next day. The patient is allowed no food for 5 hours before bleeding, so that the serum is clear. Pipette off and add an Agar solution, made by mixing one part of Agar with 1,000 of Saline well boiled and allowed to cool. One volume of this solution is shaken up with 4 volumes of Serum, and the mixture incubated at 37° C. for an hour. Peptone Powder (Armour No. 2) is added, preferably in 2½ or 3% at first, increasing to 5% (5% may be too strong at first), and the mixture is incubated for a further hour, when the Peptone will be dissolved. Phenol 0·5%, mixed with about 15 minims of Saline is then added in two portions with shaking.

To a patient with quiescent asthma this solution is given in 1½ Cc. doses intravenously every 3, 4, or 5 days, increasing gradually to 3 or 4 Cc.—A. G. Auld, B.M.J., ii./26,732; i./27,829.

The above method was an improvement on that previously described (B.M.J., ii./24,575; i./25,448,762), since it obviated the formation over the blood of an insoluble whitish clot, due to plasma as well as serum being extruded.

It has been stated that, in preference, the blood should be obtained just prior to an attack.

The following is now advised: Incubate the Agar Serum for about 2 hours at 37°C. Then 4 Cc. of a 30% *Peptone Solution* mixed with 2½ minims of Phenol is added to each ounce of the Agar Serum. *B.M.J., i./28*,171.

Witte's Peptone.—This brand of Peptone is made at Rostock in Germany. It is much more toxic in effect. According to Auld (B.M.J. i./21,696) it contains too much primary proteose in relation to secondary (roughly 1 to 2), whilst in Armour's the proportion is 1 to 7.

Some cases of asthma and hay fever are remarkably sensitive to intravenous injection of Witte's Peptone. Having found intradermal test positive in a case, A. E. Gow (B.M.J. ii./21,237) gave 0·2 Cc. of 2% solution, as a first dose, to a patient who had had asthma for many years. Within a minute he vomited; his eyes became suffused, and in less than five minutes his back was covered with urticaria.

Histamine to extent of 0·00335 Gm. in 100 Gm. was found in Witte's Peptone. This amount may produce marked reaction. Its presence in Peptone is responsible for dyspnœa, flushing, etc., sometimes produced. It is useless in the immunizing process, if not actually harmful. Armour No. 2 Peptone never gives the Histamine effect. It may be safely given to young children. *Witte's* Peptone is best given with a weaker Peptone.

Physiological testing suggested. The dermal (scratch) test may give evidence as to the presence of Histamine in a strong Peptone solution. All individuals give a marked though varied, response to extremely dilute Histamine solutions. Ergamine can be used as control. Preparations giving a large wheal are unsuited. Confirm by intravenous injection of a small dose. —A. G. Auld, B.M.J. i./21,698; i./22,835.

The majority of patients with bronchial asthma gave a positive intradermal test with Witte's Peptone but not all individuals in whom the test is positive are asthmatic. The stronger the reaction the smaller should be the initial dose for intravenous injection.—A. E. Gow, L. ii./21,281.

Anaphylactic asthma successfully treated with Witte's Peptone. Initially hypodermically 0·3 Cc. 2% solution, with sufficient Sodium Carbonate to suspend and neutralise it in Normal Saline, increased every fifth day by 0·2 Cc. up to sixth injection (1·3 Cc.), when symptoms disappeared; this dose repeated further three times and patient discharged cured.—I.M.G., June '26,285.

The **M.L.D. of Witte's Peptone** is about 0·3 Gm. per kilo in the unanæsthetised dog.—E. G. Gross, Jl. Ph. & Exp. Ther., Mar. '27,359.

For further note on Witte's Peptone see Peptone Sterules 10%, 10 *Cc.*

Sensitisation in asthma.—A. Latham and F. Coke provided a useful summary of the phenomenon. It is known that if an animal is injected with a dose of some foreign protein, *e.g.*, white of egg, normal horse serum, etc., and after a sufficient incubation period of 10 days or so a second injection of the same protein be given, profound symptoms will take place, leading even to death of the animal in a few minutes. The reaction is specific. Whatever kind of albumen or foreign protein is used to produce anaphylaxis the resulting symptoms are always the same for the same species. Asthmatics, soon after being exposed to the article, *e.g.*, food, or animal hair, to which they are sensitive, have their eyes running, and asthma develops, with sickness and diarrhœa an hour or so later. Our knowledge of what actually happens between the first sensitising dose and the second, the exciting dose, is a matter of theory. Some are more prone to sensitisation than others. With regard to predisposing factors, tens of thousands of injections of antitoxic horse sera were given during the war, but, for various reasons, these did not induce sensitisation. Theories apart, man can become sensitive, just as animals. At least 40 deaths are recorded from the injection of horse sera in man, chiefly in asthmatics, who we reasonably suppose to have been horse-asthmatics. An interesting point arises in the effect of a short surfeit of a protein, *e.g.*, strawberries, lobster, etc.—Pr., Aug. 22/121. See also B.M.J. i./21,372.

A review of 1,000 cases of asthma showed that asthma begins far more frequently in babyhood or early childhood than at any other time, and the great majority of these cases are sensitive to some protein, a range of 180 proteins being in use for testing purposes. Having discovered the specific proteins, three methods of treatment are available (1) avoidance of the protein, (2) specific desensitisation, usually successful if the correct dosage is arrived at by skin reactions, (3) the non-specific desensitisation by Peptone, or Danysz, or Mixed Coliform Vaccine. In certain cases, Peptone given intravenously is valuable. Compound Licorice Powder, holly, face powders, silk, linseed, and Aspirin, were among the causes of sensitisation.—Frank Coke, B.M.J., i./27,955.

Peptone is particularly useful in children, where the attacks are of the clear-cut spasmodic kind. It is of most use intravenously. The initial dose should be small and carefully given, because it may happen that the patient may be sensitive to the Peptone and have an attack of sickness or more grave anaphylactic symptoms. This is rare. More commonly during a course of treatment when a large dose is being given the patient will immediately flush, feel uncomfortable, and be sick. Subsequent doses in such event must be given into the muscle or subcutaneously. The value of Peptone when given in large doses to promote protein shock is not so certain nor so convenient for use as an intravenous dose of T.A.B. or the Mixed Coliform Vaccine. A course of Peptone usually consists of twelve doses given twice weekly, but there is no great harm, often great benefit, in giving the course for six months, the large doses being given at weekly intervals. Hundreds of injections given with no alarming results—with one exception.—Frank Coke, B.M.J. i./28,468.

Asthma in children may be due to a foreign protein or '**Allergen**,' which has reached the blood by ingestion in the form of food, by inhalation, or by bacterial infection. Treatment of the attack is best made by Adrenalin solution 2 to 3 minims. Treatment of the tendency is more difficult and important and consists in regulating the patient's life, diet, possible removal of adenoids and tonsils, and sometimes the use of a vaccine prepared from sputum obtained during an attack. A lengthy course of a mixture of small doses of Potassium Iodide with full doses of Belladonna or Stramonium and Arsenic of value.—R. Hutchison, B.M.J., i./27,783.

Epilepsy.—Twenty cases of *haut mal* type (average age 18 years). Peptone intravenously arrested fits in 9 and lessened frequency in a further 6. (Bristol Royal Infirmary and Stoke Park Colony for mental defectives.)—F. H. Edgeworth, B.M.J. ii./20,780. See also A. G. Auld, *ibid.* 840.

The 'action' of Peptone in disease is purely empirical.—F. H. Edgeworth, *ibid.* 871.

Intramuscular injections proved of great benefit in a man of 35 who had suffered from fits for 15 years. Various treatments were employed, but the man became worse, with a fit at least every 48 hours. The first dose of Peptone brought improvement. The full course of injections was given, four days elapsing between each injection, terminating with the Continuation Course. Should be tried in resistive cases.—G. R. Hull, Pr., Oct. 1922.

Protein tests and treatment of a special group of epileptics:—

The proteins were grouped as follows:—

(1) Egg albumin of various types. (2) Meat and fish. (3) Milk of various animals. (4) Vegetables. (5) Cereals of all kinds. (6) Peptone. (7) Control of N/10 Sodium Hydrate.

The solutions are made freshly as required, in strength 20 mgr. to 10 Cc. of N/10 alkali. The six or seven tests and the control are applied to the gently scratched skin surface. A positive reaction occurs, obvious soon after the scratching is completed, since in 15 seconds an area of hyperæmia appears, which spreads to usually the size of half-a-crown. After leaving the protein solutions in contact with the broken skin for 10 minutes, they are washed off and the results noted. In cases where a + reaction has occurred a small but definite wheal appears retaining the hyperæmic area around it. To make certain, apply a clean microscope slide to the place, and note whether the hyperæmic area can be blanched by pressure alone. In true + reactions this does not occur.

The offending protein can be removed from the dietary, and if necessary his desensitisation can be conducted by protein vaccines. Peptone *per os*, two grains twice daily, or once a day, is of value. Fits reduced in frequency.—R. L. Mackenzie Wallis and W. D. Nicol, in collaboration with Sir Maurice Craig.—L. i./23,741.

Peptone Sterules (1 and 2% strength, Intravenous), as an aid in Vaccine treatment.

In *Vaccine Therapy*, as an aid to overcome hypersensitiveness met with, especially in treating the arthritic group of infections, Peptone has been well spoken of.

A course of 10 injections intravenously is advised as follows:—

On the first day 0·1 Cc. of a 1% solution; on the second day 0·2 Cc. of 2% solution; on the third day 0·4 Cc. of 2%; on the fifth day 0·8 Cc. of 2%; on the seventh day 1.4 Cc. of 2%, and thereafter, at three or four days intervals, 1·8 Cc., two or three times. Having reached 1·4 Cc., a subcutaneous dose of vaccine can be given at the same time. This maybe rather larger than the one the patient was sensitive to before treatment. No reaction, it is stated, will occur.—H. Warren Crowe, B.M.J. i./23,1046.

Peptone Sterules 10% 10 Cc.

P. Nolf of Liége published results of subcutaneous or intramuscular injection of Peptone in treatment of hæmophilia, of purpura and even of paroxysmal hæmoglobinuria, several years ago, and later in typhoid, in 1917. He used it originally to check intestinal hæmorrhage. Streptococcal septicæmia was well treated by him with intravenous injections of usually 10 Cc. of a 10% solution. The solution must be injected *slowly*—on no account more than 5 Cc. per minute. An untried specimen must be tried a drop at a time. If nervous on the matter, give the dose in 150 to 200 Cc. of saline. The Peptone appears to have a well marked effect on the white cells and albumins of the blood plasma—the most important constituents of the blood in the battle with infections.—B.M.J. ii./20,328.

Varied forms of chronic non-infectious diseases treated by the Danysz method.—subcutaneous injections of heterogeneous bacillary proteins—or by Nolf's method—intraveneous injection of Peptone or heterogeneous injection of bacillary proteins. Gow uses *B. Coli* or *B. Typhosus*, 25 mill. to 100 mill. killed bacilli, suspended in 10 Cc. of normal saline, increasing in subsequent doses. Intravenous injection of 10% Peptone is efficacious, but decidedly more exciting to administer.—F. J. Sadler, L. i./22,929.

Puerperal sepsis. Witte's Peptone 10% solution. Dose: 8 to 0 Cc. intravenously, increased by 2 Cc. every other day, until 6, 18 or 20 Cc. is given, causes immediate and rapid fall in blood ressure and rise in pulse frequency. If the latter exceeds 34 per minute temporarily suspend.—A. E. Gow, B.M.J. ii./20,268.

eptone per os.

Dose:—0·5 Gm. (7½ grains) thrice daily, half hour before meals.

In view of the presence of Peptone practically constantly in the tomach or alimentary canal, the giving of Peptone *per os* looks ike carrying coals to Newcastle.—A. G. Auld.

Migraine in dyspeptics, benefited by 7½ grains of Peptone *per os*, hour before the three chief meals.—Pagniez and Nast, L. ii./20,143.

In some epileptics small doses found of value.—R. L. Mackenzie Vallis and W. D. Nicol—*vide* abst. under Epilepsy *antea*.

URTICARIA.—Peptone *per os*, 0·5 Gm. three times a day, half an hour efore meals, has been successfully administered in certain cases. Urticaria ivided into numerous groups, *e.g.* (i) Alimentary group, *e.g.*, shell-fish, eggs, tc. (ii.) Drugs, *e.g.*, Arsenic, Morphine and Salicylates. (iii.) Acute infecions and specific fevers, *e.g.*, influenza. (iv.) Chronic infections and focal epsis, *e.g.*, rheumatoid arthritis. (v.) Reflex nervous, *e.g.*, eye-strain, exciteent. (vi.) Endocrine dysfunction.—H. G. Hannay, M.P.C., Jan. 31/23,91.

On the assumption that urticaria is a manifestation of the anaphylactic tate, Peptone has recently been advocated by French dermatologists—0·5 m. 1 hour before each meal.—R. Hallam, L. i./27,1360.

An assistant of ours (P. H.) suffering from persistent urticaria took 10 grains *d.* to which it promptly responded.

LICHEN URTICATUS, or STROPHULUS (a troublesome ailment of infants). 8 were cured by administration of Peptone—granular form—by the mouth, n hour before each meal, for 10 days. Details of diet and times (*q.v.*), must e strictly adhered to.—Paris Med., Apl. 24, '26, per L. i./26,1051.

Abstracts from literature on Non-Specific Protein Therapy.

Pyrogenic Therapy. (**'Protein Shock'** of American workers). The iew is gaining ground that the high temperature which is ushered in by a igor more or less severe is the crucial factor. Results were obtained with ertain colloidal metals intravenously which were attributed to the protecve used. Alfalfa Seed proteose, caseose, lecitho-protein and B. typhosus sed as pyrogens with good reactions and results. Elderly feeble patients e not suitable. A full pyrogenic reaction, *viz.*, good rigor, high pyrexia, dy pains, profuse sweating and usually sickness and diarrhœa are requisite. menable to the treatment are arthritis, neuritis and neuralgia, certain skin fections and subacute or chronic inflammatory exudations.—A. G. Auld, .M.J. ii./21,822.

SCIENTIFIC BASIS OF NON-SPECIFIC PROTEIN THERAPY.—It developed along urely empirical lines from specific treatment from serums and vaccines, ut in spite of the specific aspect it was established that in many cases nonecific vaccines and serums were as active as the specific. Intravenous se of proteins and their products was found to be particularly effective. eptone (intravenously) gives a less violent reaction than vaccines. It pears probable that the common active principle is a product of protein ecomposition. The toxic effect of Witte's Peptone is well known, but it important to note that so-called peptone poisoning is produced by prooses and albumoses, and that proteins when broken down completely to eptones have very little toxicity. Witte's Peptone produces, on heating ith acid or alkaline Alcohol, **Vasodilatin.** 1 Gm. yielded 0·3 Gm. of this, d the minimum lethal dose of the peptone was 4 mgr. per Gm. of mouse, hile the minimum lethal dose of Vasodilatin was 0·1 mgr. per Gm. **Hisamine** in Witte's Peptone is not more than 3 mgr. per 100 Gm. It is pracally non-toxic. With regard to the blood changes effected by the method, there is no doubt that these protein cleavage products have a strong lymphagogue action, and produce increased permeability of the capillaries, especially in the liver and in the skin. A survey of work by various authorities shows that non-specific Protein Therapy causes a washing out of the tissue fluids into the blood, causing a number of changes in its composition. The evidence at present is insufficient to show which of these changes is really of chief clinical importance.—A. J. Clark, B.M.J. i./23,315.

Bronchial Asthma.—A review of recent methods of treatment; (1) Intravenous Peptone, (2) Danysz method of vaccinating with autogenous and heterogeneous cultures of all the intestinal micro-organisms that will grow on a sloped gelatin or Peptone culture, (3) massive intravenous doses of dead typhoid bacilli. '*Hypersensitiveness*' is probably brought about by the passage of the offending substance through the mucous membrane. The majority of us owe our protection to some quality in the mucous membrane in which the asthmatic or member of the allied group is deficient.—A. Latham, L. i./22,261. (*Cf.* abstract under Tuberculosis and Typhoid.)

A case typical of many is recorded of a boy of 14, with parents and antecedents asthmatics. Attacks lasting a few days. Turbinals cauterized 4 years previously without effect. Horse-sensitive—gets violently sick on eating a soft-boiled egg, but tolerates hard-boiled. + Dermal reactions to horse hair and egg. Eleven intravenous injections of peptone caused asthma to cease (after the 5th). Eight months after, he reported himself well, but skin tests remained, though less marked. Ater ten months, again reported well and could eat soft eggs with impunity. Dermal reaction still to egg and to horse hair. No asthma on proximity to horses. Other interesting cases, some under treatment for lengthy period, demonstrate the value of the treatment.—A. G. Auld, L. i./23,790.

Asthma and allied disorders—discussion on, opened by Sir H. Rolleston, B.M.J. ii./21,233; L. ii./21,281.

Eleven out of 20 bronchial asthma patients 'more or less' improved with intravenous injections of a 5% solution, the doses increasing from 0·5 to 3 or 4 Cc. The writer agrees with Dr. Auld that the intervals of recurrence of the attacks become less frequent after Peptone Therapy.—P. Boot, 'The Treatment of Bronchial Asthma by Intravenous Injections of Peptone,' Review, *Lancet*, i./26,606.

Intradermal injections of Peptone in asthma and hay fever given at the time of attack.—Per Pr., June '27,397.

In British East Africa, 25 cases of bronchial asthma (which is very common) have been treated intramuscularly, commencing with 2 Cc. doses, at intervals of 5 or 6 days. Smaller doses were found practically useless for adults. In all these cases (of 6 months to 5 years' standing) beneficial results were obtained, improvement being usually noted after the third injection. —E. F., June '26.

CHRONIC CASES OF URTICARIA, SEBORRHŒA, SEBORRHŒIC ECZEMAS, DERMATITIS DUE TO IRRITANTS, AND CHRONIC SKIN CONDITIONS generally, where the patient is sensitised, are affections in which excellent results were obtained using 'Sterules' Peptone 5%, injected intravenously. It is essential to use a reliable brand of Peptone and one that is Histamine-free. In acute conditions the intramuscular injection of 5 Cc. of the patient's blood giving a further injection of 10 Cc. five days later, and continuing with this quantity at intervals of 5 days, seemed to give good results. The reduction of the pH value of the urine (if it is to be hyperacid) to normal by means of an alkaline mixture is also advocated.—H. R. B. Hull, Jl. R.N.M.S., Apl. '26,147.

In ***military medical practice*** Sterules found to be the most convenient form of Peptone for the sensitisation of the body, whether local or general, particularly in cases of local densitisation such as seborrhœic dermatitis that has been scratched and infected with a skin staphylococcus, and of general sensitisation such as urticaria. The graduated doses are 'fool proof' and an overdose in a highly sensitive patient is impossible. They have a remarkable effect on most cases of asthma.—Jl. R.A.M.C., Nov. '26,400.

MIGRAINE.—In the treatment of migraine, resistant to the commoner methods, some cases (7 out of 20) showed marked improvement after 8 to 10 injections of a 5% solution, from 5 to 25 minims being injected at a time, each dose being increased by 5 minims.—L. ii./27,241.

DERMATITIS HERPETIFORMIS.—Peptone *subcutaneously* said to have given good results in a few cases.—Jl. A.M.A., ii./25,631.

Before and after Salvarsan injections given intravenously.—Schreiner, B.M.J.E. ii./20,74.

Chronic Arthritis, Non-specific protein injections in.—***T.A.B. Vaccine*** intravenously produces rapid improvement in 80—90% of cases, which is maintained in between 50—60%, the types responding best being acute and subacute, where disease s confined to the periarticular tissues. Injections of no use unless all possible foci of infection removed. Reactions severe, but contraindications few—disease of myocardium, gross kidney disease, chronic alcoholism, tuberculosis and syphilis being the chief. Cases of the menopause group of the chronic villous type and those showing achylia do not do well. Initial dose 100 mill. (in private practice 50 mill.), increased at each subsequent dose by 100 mill., 4 days elapsing between injections. Dosage should be regulated to produce rigor, sharp rise of temperature, quick fall, and profuse perspiration. Of 50 cases treated 44 were discharged after 4 weeks as definitely improved.—W. Yeoman, L. i./26,1246–50; see also Leader, 1265.

In a small percentage of cases miraculous results with non-specific agents, either protein or preparations of B. typhosus. More might be done to search for that part of the protein molecule that is therapeutically active.—A. Goodall, L. ii./26,1065.

The results in rheumatoid arthritis from Typhoid vaccine intravenously may be as much attributable to stirring-up of focus of infection as to stimulation of the defensive mechanism of the body, and the ultimate factor in determining cure may be the response to the antigenic activity of the infecting organism, this response being evoked not directly but indirectly by the protein injected.—E. M. Dunlop, B.M.J., ii./24,1110.

Good results in rheumatic or fibrositic conditions and toxæmic states, *e.g.*, urticaria. Contraindications, marked debility, tuberculosis, diabetes, and advanced cardio-vascular disease. Primary dose, 0·4 Gm. of Peptone for a man, 0·3 Gm. for woman, intragluteally with injections at 5 or 6 day intervals of twice preceding dose. Three or four injections usually effected cure. Dosage regulated to obtain reaction temperature of about 101° F.—E. Bulmer, Edin. Med. Jl., per B.M.J.E., i./25,8.

In addition to injection of proteins, *e.g.*, proteose preparations and bacterial vaccines, which are efficacious in cases of arthritis, including rheumatoid arthritis, other measures for producing non-specific effects have been employed, *e.g.*, the artificial abscess following ***subcutaneous injection*** of ***Turpentine,*** and even artificial interposition of another infection. There s justification on the laboratory side. In pigeons, a relative immunity to B. avisepticus has resulted from injection of B. coli, vaccine.—T. J. Mackie, B.M.J., i./25,291.

Fibrositis—a large proportion of cures and improvement by protein shock therapy, using a combination of toxin and bacterial protein.—G. Paul, L. i./25,711.

Rheumatoid arthritis showed marked improvement from use of Peptone. —J. Eason, L. ii./26,1065.

Arthritis deformans treated with peptone intramuscularly, 0·2 Gm. dose weekly.—Goodall, B.M.J. i./23,512.

Articular rheumatism (300 cases) treated by massive doses of Sodium Salicylate, 10 Gm. increased by 2 Gm. daily to 18 Gm., and Sodium Bicarbonate 20 Gm. increased to 36 Gm., combined with shock induced by Colloidal Silver injection, Peptone or Milk. Large quantities of water taken.—Brux. Med., June 14, '25. Per Pres., Feb. '26,77.

See also p. 915 *and* 1088, *and Therap. Index.*

Asthma.

True cases of bronchial asthma benefited by prolonged injections of P.T.O. lutions, beginning with 0·5 Cc. of 1 in 1,000,000 and gradually increasing.

The treatment must be kept up for a year at least and injections twice a week are given for the first 4 months, then once a week for 4 months, and lastly once a fortnight.—T. Nelson, Pr., June, '27,382.

Value of Peptone in asthma due to shock effect on sympathetic nervous system, and the pulmonary vessels and bronchial muscle fibres under its control. Often rapidly effective in checking forms of diarrhœa hæmoptysis. Pyrexia should never follow.—B.M.J.E., i./26,3.

Asthma in children. According to Ratner, the hair of rabbit comes second to horse hair as an ætiologic factor in the production of asthma. Rabbit fur is largely used in the manufacture of children's clothes and toys.—(American Jl. Dis. Child, 1922, 24, 346). M.P.C., Jan. 31/23,88.

Tuberculin in treatment of asthma acts merely by virtue of its Protein content.—L. Hofbaver, W. Klin. Woch., Dec. 3, '25,1311. Pres. '26,158.

MALTA FEVER.—Protein Therapy a useful adjuvant in the treatment of.—Per Jl. A.M.A., ii./25,1999.

COLITIS AND HÆMOPTYSIS.—Favourable results with Peptone. Excellent effect in asthma confirmed.—H. Pollitzer, per Jl. A.M.A., ii./25,2001.

GASTRIC AND DUODENAL ULCER has been treated by protein therapy. Disappearance or reduction in 29 out of 51 cases.—V. Gromer, Med. Klin., June '26,991, per Pres., Jan. '27,19.

Histologic study of the ulcers did not reveal any curative effect from Protein Therapy on peptic ulcers.—Per Jl. A.M.A., ii./25,1013.

DIABETES MELLITUS well treated by Protein Therapy.—B.M.J.E., i./26,25.

MILK HYPERSENSITIVENESS. **Apart from such general reactions as asthma urticaria and the like, the stomach may be, or become, hypersensitive to various foods, and of all foods milk is the most likely to disagree. Account of three remarkable cases.—T. Gillman Moorhead, M.P.C., Jan. 17/23,46.**

In ANTHRAX, intramuscular injection of Peptone 3% in doses of 30 Cc. daily in 43 cases. The results were as good as those obtained when a normal or specific serum was used.—R. F. Vaccarezza and Co-workers, per T.D.B. 19/22,897.

PNEUMONIA, SUBSEQUENT TO OPERATIONS INVOLVING THE UPPER ABDOMEN, thought to be anaphylactic in origin, the protein shock coming from the intestines. Desensitisation before the operation with Peptone 0·3 Gm. in Normal Saline 2 Cc. is now carried out when time permits in all abdominal sections and no case which has had Peptone has developed pneumonia.—M. Dixon, B.M.J., ii./27,985.

For treatment of hay fever with Pollen Extracts see **Hay Fever.**

Milk Injection. Sterilised.

Dose.—5 to 10 Cc. intramuscularly but much smaller doses have been used in certain affections.

Milk Sterules 5 and 10 Cc. are made.

(The milk in preference should be freed from the bulk of its fat.)

The gonococcus cannot resist a high temperature. It has been observed that if an intercurrent febrile disease arises whilst a patient is suffering from gonorrhœa or an acute epididymitis complicates the case, the urethral discharge may cease without returning. Schmidt and Saxyl reported in 1916 that protein reactions could be produced by milk injections. Hence these injections which have the power of raising body temperature might have effect on the gonococcus.

The method was tried in acute and subacute stages of gonorrhœa, injections into the gluteal muscles of sterilised milk in 5 Cc. doses, 10 Cc. into each buttock being given. Chill, general malaise and rise in temperature followed; normal in 24 hours. Dangers nil and results good.—M. W. Browdy, L. i./23,874.

Good results in acute gonorrhœa with milk injections combined with loca treatment. Initial dose 4 Cc., increased by 2 Cc. Duration of treatment shortened.—B.M.J.E., ii./24,86.

Milk injections in gynæcology.—B.M.J.E., i./25,13.

INFANTILE CONVULSIONS treated with milk injections. After giving 10 inims into the child's thigh the effect was magical. ? Anaphylaxis the tual cause of the fits, and whether the injection of milk desensitised the fant. Also found successful in diarrhœa.—W. A. Wilson-Smith; B. P. abawala, B.M.J. i./23,238.

Subcutaneous injections of milk in infants.—B.M.J.E., i./26,30.

INTERSTITIAL KERATITIS well treated with combined treatment of Neosalrsan (intravenously) and milk (intramuscularly).—Van Lint, per Pres., eb. 23,73.

Intravenous injections of Yeast or ferments such as Zymase or Trypsin roduce inflammation of the uveal tract. Milk injections (intramuscularly) ave proved of great value in EYE AFFECTIONS attributable to bacterial proeins circulating in the blood stream.—per Pres., Feb. 23,72.

ERYSIPELAS of face cured by Milk injections.—A. Jensen, Ugeskr, f. Laeger, an. 28, '26,87, per Pres., Oct. '26,355.

G.P.I.—Milk Therapy considered superior to anti-syphilitic treatment. njections of 10 Cc. of sterilised milk under the skin of the abdominal wall.) cases of G.P.I., many of chorea, and several of epilepsy treated by this ethod in Budapest.—L. i./24,1231.

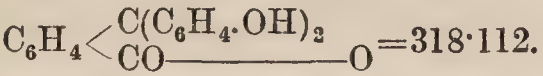
LOBAR PNEUMONIA.—Of all the methods tried (including Mercurochrome) ilk injections yielded the lowest mortality and the therapeutic effect seems be about the same as obtained by expectant methods of treatment. Inections of 10 Cc. of pasteurised cow's milk repeated once or twice. Of 23 ases treated 6 died.—H. R. Eichelbaum, U.F.C., '25,205.

The good results obtained from specific sera may be as much the result f a foreign protein as of the antibodies supposed to be contained in the sera. qually good results obtained in same class of cases following the administraon of either a specific serum or of boiled milk.—W. E. Deeks, Int. Conf. rop. Am., '24,223.

PHENOLPHTHALEINUM (*B.P.* '14).

U.S., Ph. Ital. IV., P.G. VI.

Syn. *PURGEN (T.M. 243986 and 286636 Assoc.), *LAXOIN T.M. 253802), LAXATOL, LAXANS, LAXEN, PHENOLAX, DIHYDROXYHTHALOPHENON.



$$C_6H_4<\begin{matrix}C(C_6H_4.OH)_2 \\ CO\text{———————}O\end{matrix}=318{\cdot}112.$$

Dose (*B.P.* '14).—2 to 5 grains (**0·12 to 0·3 Gm.**), but larger doses re used. To be given in preference in fine powder *e.g.* in Slipule No. 1 for 3 grains) or as effervescent.

A crystalline substance M.pt. 250 to 253° C. made by interaction f Phenol and Phthalic Anhydride. Soluble 1 in 10 of alcohol 0%, but only 1 in 600 of water.

harmacology.

Phenolphthalein is dissolved in the bile and alkali in the intestine, and being ow slightly irritant to the intestine, causes peristalsis. It is partly absorbed nd excreted by the liver, and so acts again and again in the intestine—it cts hence for a few days as a mild aperient.—D. Grieve, P.J. ii./21,490.

Uses.—As a purgative. Ordinarily ½ to 3 grains is sufficient, ut patients confined to bed require from 3 to 10 grains. Does not rritate the kidneys. It is satisfactory for prompt action, as in aundice. It is more active than Cascara and less griping, and as been found ideal in intestinal toxæmia.

Skin eruptions from Phenolphthalein in U.S.A.—B.M.J.E. i./22,81. Pres. May 22, 182; July 246; B.M.J.E. i./23,81; Clin. Jl., Dec. 19/23,611.

Capable of destroying red blood corpuscles and inducing toxic degeneratio of the kidneys, cases cited.—per Pres., Jan. '23,15.

Many cases of poisoning recorded although dosage was within the maximu limit.—K. Schmilinsky, per Clin. Jl., Jan. 31/23,59.

We have never come across any of these bad effects.

Phenolphthalein Tablets, ½, 2, and 4 gr. are made.

Under the name "Purgen," is supplied as "Infants" containin Purgen ¾ gr., "Adults' Purgen" 1½ gr., and "Strong Purgen" 7½ gr

Ⓟ **Tablets Phenolphthalein Compound.**

Phenolphthalein 1 grain, Strychnine Hydrochloride $\frac{1}{250}$ grain Belladonna Extract (*B.P.* '14), $\frac{1}{100}$ grain. These weigh 2½ grain (0·15 Gm.). A useful combination.

Tabellæ Phenolphthalein with Chocolate Basis are made ½, and 4 grains, also **Tabellæ Phenolphthalein** (4 grains) **cum Extract Rhei** (3 grains).

Effervescent Phenolphthalein.

Dose.—One to two teaspoonsful in half a tumbler of warm wate a good half hour before breakfast. Contains 3 grains per drachm A satisfactory mild laxative taken first thing in the morning.

Phenol Sulphone-phthalein. U.S. X. *Dose.*—(By injection $\frac{1}{10}$ grain (**0·006 Gm.**). ('**Phenol Red**'), is employed as a test fo permeability of the kidney. *See Vol. II.*

Fluorescein.—Tetraoxyphthalophenon Anhydride.

Resorcin-phthalein Anhydride. $C_{20}H_{12}O_5$ = 332·096.

In yellowish red powder, *sparingly* ***soluble*** in water, more so in presence of an alkali, *e.g.*, Sodium Hydroxide, forming **Sodium Fluorescein** *Syn.* **Uranin**; showing a green fluorescence.

For use as an indicator in acidimetry (suitable for Ammonia). Prepare Solution of the dye 0·4 Gm. in Alcohol 90% 50 Cc. and add Water 30 Cc. Stand the flask on black ground, using 5 to 10 drops.

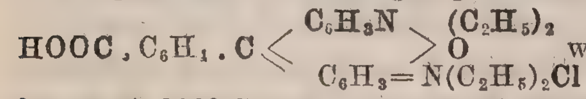
May be used as proof of death by injection. There is no reaction in case of death but if death is only apparent, the integument and the eyes turn green in a few minutes.—P.J. ii./11,436.

Liquor Fluoresceinæ, R.O.H. Fluorescein 2 and Sodium Bicarbonate 3 in 100. Useful to diagnose corneal lesions. The ulcers and parts denuded of epithelium take a green colour, which persists for 2 or 3 hours. Loss of substance in conjunctiva is denoted by a yellow colouration.

'**Sterules**' of **Fluorescein** solution are cleanly in use.

The **Rhodamines** have remarkable tinctorial power—the red dye classed as 'G extra' especially. The colour in a milligram of a solution containing 0·000,000,000,0001 Gm. is discernible.—L. i./13,184.

A representative of the group of Rhodamines is



$$\mathrm{HOOC\,.\,C_6H_4\,.\,C} \begin{cases} \mathrm{C_6H_3N(C_2H_5)_2} \\ \quad > \mathrm{O} \\ \mathrm{C_6H_3{=}N(C_2H_5)_2Cl} \end{cases}$$

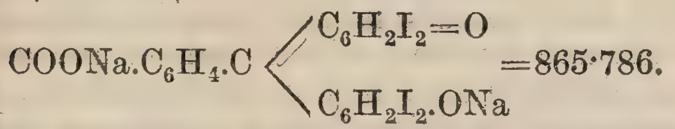
which is obtained by heating for several hours at 200° C. one molecule of Phthalic Anhydride with two molecules Diethyl-m-amido-phenol.

Fluorescent substances may play a defensive role in the skin, and an opposit one in the blood stream.—P. Redington Peacock, B.M.J., ii./25,584.

odium Tetraiodophenolphthalein.

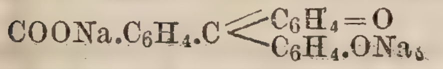
Syn. 'IODO-RAY,' TETIOTHALEIN SODIUM, IODEIKON, ✱OPACIN T.M. 478,478), ✱CHOLUMBRIN (T.M. 481,225), PILIOPHEN.

(This, and the parent acidic substance were mentioned under the ames ANTINOSIN and NOSOPHEN in E.P. IX (1898), with ½ Gm. oses.)



$$\mathrm{COONa.C_6H_4.C}\left\langle\begin{array}{l}\mathrm{C_6H_2I_2{=}O}\\ \mathrm{C_6H_2I_2.ONa}\end{array}\right. = 865{\cdot}786.$$

(It is of interest to compare the above formula with that of the correspondg Di- Sodium Salt of Phenolphthalein.



$$\mathrm{COONa.C_6H_4.C}\left\langle\begin{array}{l}\mathrm{C_6H_4{=}O}\\ \mathrm{C_6H_4.ONa}\end{array}\right.$$

indicate the position of the Iodine atoms, distinguishing from Sodium henol-tetraiodophthalein, described later.)

hemical Characters.

A blue-coloured powder, somewhat hygroscopic, with slightly romatic taste, readily soluble in distilled water and almost inoluble in Alcohol. An aqueous solution may throw out on standing, wing to absorption of Carbon Dioxide and deposition of the acidic ody. On the addition of Hydrochloric Acid to a solution the ream-coloured Tetraiodophenolphthalein is precipitated.

ssay.

The Iodine content may be ascertained by fusion with Chloride-free Sodame, adding Sulphurous Acid, dissolving in Nitric Acid, adding excess of ilver Nitrate and back-titrating the uncombined Silver with Ammonium ulpho-cyanide. The compound should contain not less than 53%. Theory 58·6%.

odium Content (Alkalinity).

In the author's laboratory it is the rule to determine the percentage of ee and combined alkali by adding excess of standard acid, heating to expel O_2 and then titrating back with N/10 Sodium Hydroxide to a pale blue colour. he sulphated ash yield is a good control. Theory for total Sodium is 5·31%.

terility of Solutions.

Our experiments have shown that solutions can be sterilised in a *boiling ater-bath* for 15 minutes without decomposition, but high temperatures, *g.*, 130° C., cause decomposition. We give these facts as 'sterilised' solutions e asked for but we fail to see how organisms can either live or multiply a solution of the compound.

oxicity.

The compound should have a tolerated intravenous dose for animals of 25 Gm. per kilo as mentioned by Graham and others. A higher dose uses toxic symptoms.

From animal experiments which we have had conducted we find it is not ossible to draw conclusions from results with *mice*. Larger animals, *e.g.*, *bbits*, give more reliable data.

N.B.—Further, 250 mg. per kilo intravenously can *NOT* be read as equivant to 16 Gm. for a 10-stone man. On the contrary, one could reckon—sing Meeh's Formula—4 Gm. approx. intravenously as the limit dose.

We had the above toxicity confirmed (1926) with a sample specially made. mmediate death occurred with 260 mg. per kilo in rabbits. Our criticism ould be that the dose *needed* for a shadow is rather near the lethal dose. addition, one might assume with reason that man would be more sensitive an the rabbit.

ses.

Caution.—Great care is requisite in the intravenous use of this nd the Bromo-compound. Clinical reports have varied.

This, and the analogous Tetrabromphenolphthalein, has been submitted to extensive trials in this country as diagnostic of cholecystic disease by the method of X-Ray visualisation known as **Cholecystography.**

They have been advocated as the most suitable of numerous chemicals which, following intravenous or *per os* administration, are excreted by the liver into the gall-bladder, rendering it opaque.

The method was originated by the work of Graham and others in the U.S.A., and was discussed at numerous meetings here, *e.g.*, at the International Congress of Radiology held in London on July 1 1925. (See a paper by R. D. Carman on work at the Mayo Clinic L. ii./25,67.)

Iodine having a heavier atomic weight than Bromine it is expected the compound containing this halogen would yield a better shadow than the Bromine body, other things being equal.

ORAL USE.

Dose of 'Iodo-Ray' *per os* for an adult.—A total of 3 to 5 Gm. usually suffices, based on a figure of 0·04 to 0·07 Gm. per kilo.

This dose may be given either (*a*) in the form of '**Stearettes**' or other medicament coated so as to pass through the stomach and dissolve promptly on reaching the alkalinity of the duodenum thus obviating vomiting, or (*b*) in **Slipules** (plain uncoated capsules) with the possibility of vomiting following.

Technique of Administration.

'Stearettes' and Slipules are prepared containing 0·5 Gm. each (10 giving 5 Gm.) and 0·3 Gm. (16 giving 4.8 Gm.). The former are used in preference, as fewer are needed to obtain the total dose. Slipules containing 1 Gm. have obvious additional advantages.

Large draughts of water are often given with the substance.

The 'Stearettes' or Slipules, one or more at a time at 10 to 15 minute intervals, are taken either during the evening meal or within two or three hours after. If given about 6 p.m., it should be possible to get good X-Ray pictures the next morning.

The following procedure has given satisfaction:—The patient is given a fat-containing meal. (Fat is given in order to empty the gall-bladder.) Two hours afterwards, the patient being in bed 10 of the Slipules (0·5 Gm. each) are taken, two every ¼ hour. During and after the taking of the Slipules the patient is to lie on his right side. No food should be given during the period of the X-Ray examinations and no breakfast should be taken the following morning.

F. Melville, Radiologist, X-Ray Dept., U.C.H.S. employs 1-Gm. Slipules dipped in melted Stearin at the time of use.

The position of the gall-bladder shadow and the rate of its emptying varies with the type of bodily habitus. Only very mild toxic symptoms (such as slight epigastric discomfort) were exhibited in a very few of 100 students in whom the method of diagnosis was tried. Five 1 Gm. capsules dipped in Stearic Acid were given for a dose, during the evening meal, a fair quantity of water being taken. A radiogram was taken 14½ hours later, without breakfast, and then 2 hours after with fatty meal, and 16 hours after taking the capsules a second radiogram is taken. With a current of 30 m.a. the distance of the tube from the individual should be 36 inches, exposure 4 to 6 seconds, and spark gap 5 inches. The tube is centred over a point a hand's-breadth to the right of the spine of the second lumbar vertebra and the radiogram is taken with the abdomen towards the film at the end of inspiration. Certain normal individuals who fail to give a shadow on the first investigation may on a second investigation give a positive result. Thus a negative cholecystogram, in the absence of clinical evidence, is less reliable than positive cholecystographic evidence of disease.—F. Davies, B.M.J., i./27,1138.

Pills of the compound, if used at all, must be of the compressed type without any excipient. Any added gum unfits the substance for use since it prevents the rapid disintegration which is the *sine quâ non* for success. We have seen radiographs showing Stearin-coated pills, made with excipient, intact in the intestines 24 hours after taking.

Intolerance.—Vomiting, nausea and purgation may be experienced. The vomiting has been eliminated by the injection of a little Adrenalin solution. Atropine has also been given prophylactically.

Period at which X-Ray Pictures are taken.

Three X-Ray examinations are usually necessary between 10 and 24 hours after taking the Iodo-compound, the best pictures being generally obtained at about 16 hours. The shadow of a normal bladder is seen well defined at the 12*th hour*, it is increased at the 15th, and there is diminution in size and density at the 20th hour.

A 5-inch spark gap may be used, the tube being kept a good distance away (*v.* F. Melville *antea*).

References to Oral Use.

Cholecystography is not likely to be widely used unless the salt is given by the mouth in ordinary cases and intravenously only after negative results from oral use. In the majority of cases the gall-bladder can be seen clearly after oral use, which produced less frequent and severe toxic symptoms.—A. F. Hurst, B.M.J., ii./25,1151.

Cholecystograms produced in 93% of normal subjects by Salol-coated pills.—Whitaker and Co-workers, Jl. A.M.A., ii./25,305.

Results from oral use agree closely with the intravenous and with operative confirmation, but the intravenous method gives a denser shadow. Oral use advised as routine with doubtful cases checked intravenously, caution being observed in case of patients with a cardiac lesion. A correct diagnosis obtained in 95% of 467 patients.—E. V. Graham and Co-workers, Jl. A.M.A., ii./25,953.

Diagnosis, treatment and prevention of gall-stones. Intestinal pills are advised. The salt is absorbed into the portal circulation and excreted in the bile. It then reaches the gall-bladder, the mucous membrane of which absorbs water from the bile and so leads to its gradual concentration, until about 12 hours after the pills are swallowed a shadow can be seen—a good account. As to treatment, biliary antiseptics, *e.g.*, Urotropine, large dose, even up to 300 grains a day.—A. F. Hurst, B.M.J., ii./26,677; L. i./26,966.
(See also Hexamine—its action as biliary antiseptic.)

Oral method employed almost exclusively at Middlesex Hospital.

Variations in the strength of gastric and pancreatic juices cause trouble in perfecting a capsule coating. Possibility of local damag due to extravasation a serious drawback to intravenous use *Technique.*—The patient is prepared as for an ordinary skiagram of the gall-bladder. An ounce of Castor Oil is given one nigh and ½ ounce the next. Light breakfast and a very light lunc are permitted on the following day, and an ordinary skiagram o the gall-bladder is taken in the afternoon. Tea and bread an butter are permitted on the same day and another small meal a 12 p.m., during which the drug is swallowed in the form of capsules The dose given is 5 Gm. (4 Gm. if the patient weighs under 10 lbs.), administered in ½ Gm. capsules. A cup of tea only is given on the following morning and X-Ray examinations at 10 a.m. 2.30 p.m., and 4.30 p.m.—T. Izod Bennett and Co-workers, L ii./26,20, B.M.J., ii./26,195,681.

Intravenous use is perhaps more accurate, but oral use is quite accurate enough for routine. Ill-effects insufficient to cause alarm and in 20% of cases there was no reaction. Preparations o Mallinckrodt and Martindale used.—J. H. Anderson (Ruthin) B.M.J., ii./26,682.

Oral use (Iodo-Ray 'Slipules') gave correct diagnosis in 92% of 100 consecutive cases. A faint shadow of gall-bladder afte giving the dye once does not warrant diagnosis of a pathologica gall-bladder. Early cases of Cholecystitis may give normal shadows Occasionally a normal gall-bladder may fail to give a shadow.— P. G. McEvedy and J. E. Sheret, L. i./27,1120.

Results in 125 cases as satisfactory with the oral as with the intravenous method, using 4·5 Gm. of the Iodo-compound in Keratin coated capsules, each containing 0·3 Gm. The shadow takes longe to appear but is equally dense. Except for 8 complaints of nause and one case of actual vomiting, all the patients were quite unaffecte by the drug. The diagnosis was confirmed in 94·3% of cases.— J. H. Mather and W. R. Williams, B.M.J., i./27,614.

Use *per os* here better than in U.S.A.—L. ii./27,982.

Oral use in the Mayo Clinic good—may well be repeated in doubtful cases Only a few patients need be submitted to the more uncomfortable and dangerous intravenous method.—G. B. Eusterman, Jl. A.M.A., i./28,197.

Combined Cholecystography and Barium Test Meal an invaluable diagnosti aid in female patients presenting the cholecysto-duodenal syndrome.— D. P. D. Wilkie, L. ii. /27,1228.

Unpleasant effects from oral use eliminated by mixing the salt with whit of egg and then adding to cooked cream of wheat (about 4 ounces). Film as good as by other oral methods.—H. Morris, B.M.J., i./28,305.

Death coincident with oral use in a man of 62. The relation of the taking of the compound to the onset of acute hepatic degeneration found *p.m.* could not be stated.—G. E. Dyas and S. C. Dyke, Brit. Jl. Radiol., March, '28.

Duodenal tube method of giving.—Satisfactory results.—I. O Palefski, Med. Jl. & Rec., Apl. 15, '25,; see also M. Einhorn, W. H. Stewart and E. J. Ryan, Med. Jl. & Rec., July 15, '25,77. See also W. H. Stewart Am. Jl. Roent., Apl. '25.

Sodium Bromide *per os* has also been given, *q.v.*

The di-Iodo compound of Atophan, *Syn.* ✱**Biloptin** (T.M. 474564 has been suggested for use in cholecystography instead of the Phenolphthalein compounds.—Pres., Oct. '27,383.

Intravenous Use.

Many authorities are of the opinion that this technique should not be employed as a routine method. The injection into the blood stream of a concentrated (10% or more) solution of a Phenolic body of this kind, containing 58·6% of Iodine, in the massive dose of 5 Gm., as has been advocated, is a procedure which cannot possibly be undertaken without a grave element of risk. There is the probability that the substance is in part decomposed by the labile Carbon Dioxide present, resulting in thrombosis. It is not a definite crystalline compound, *e.g.*, like Sodium Iodide—on the contrary, it is liable to variation according to technique in manufacture.

Furthermore, any slight decomposition following storage of the chemical in the dry form, through the action of the atmospheric Carbon Dioxide, is negligible in the case of oral use, but the same is not true from the aspect of a compound to be injected into the blood stream unless the solution is filtered just before use. In brief, if the surgical operation of an injection can be replaced by a simple *per os* diagnostic that procedure should be the method of choice from the aspect both of the patient and the radiologist.

We are also inclined to think that intolerance in some cases must have actually been due to abnormality of the patient. Certain results of which we have knowledge would otherwise be entirely incapable of explanation.

Technique of intravenous use generally employed.

(*For modifications by individual workers see refs.* antea et postea.)

For a patient of 115 to 160 lbs. (52 to 72½ kilos) 3 Gm. is dissolved in 24 Cc. or 3·5 Gm. in 28 Cc.—the most recent accounts advise 40 Cc. as the volume of water. Sterilise by heating in boiling water for 20 minutes (totally unnecessary, we believe). For patients of less weight reduce the dose.

The dose is given (in two injections at an interval of ½ hour) first thing in the morning. Breakfast is omitted. At noon a glass of milk is taken, and the evening meal as usual. Water *per os* is allowed at all times.

Transitory fall in blood pressure.—0·5 to 1 Cc. of Adrenalin solution intramuscularly has been used to relieve this.

References to Intravenous Use
(*arranged approximately chronologically*).

A dose of 3 to 3·5 Gm. in 28 Cc. of water employed.—R. D. Carman (Mayo Clinic), Int. Cong. Radiol., L. ii./25,67,94.

Not a method to be undertaken lightly.—A. F. Hurst, B.M.J., ii./25,1151.

The vast majority of patients have no symptoms from the Iodo-compound by the mouth. Of 100 ambulatory cases receiving intravenous injection, 13 had slight nausea or vomiting, 2 vomited and had backache, and one with myocarditis and low pulse pressure had nausea, vomiting, and a considerable fall in blood pressure. Caution needed when injecting patients with a cardiac lesion.—E. A. Graham and Co-workers, Jl. A.M.A., Sept. 26, '25,953.

After injection, a few patients may have unpleasant symptoms, such as dizziness, nausea, various body pains, and fall in blood pressure. The use of Tetraiodophenolphthalein Sodium is in the experimental stage and ***workers are cautioned as to the selection of types of***

cases in which it is indicated and possible toxicity in large doses.—N.N.R., per Jl. A.M.A., Sept. 26, '25,975.

Atropine prophylactically to prevent the disagreeable ill-effects which the injection of the dye causes in some patients.—B. O. Pribram, Deut. Med. Woch., per Jl. A.M.A., Oct. 10, '25,1171.

It is surprising that in spite of the rather voluminous literature dealing with these substances so little attention has been paid to the untoward reactions. Graham, Cole and Copher reported that a 12·5% solution of the Iodo- compound at times produced induration at the site of injection. There is no doubt that much harm and even fatalities may be caused by overdose. The writer (Rosenau) is against the indiscriminate injection of these halogenated phthaleins. This article is very condemnatory, bearing on the subject that on hydrolysis these compounds act on tissues like solutions of Caustic Soda.—W. H. Rosenau, Jl. A.M.A., Dec. 26, '25,2017.

Dose of 5·5 Gm. in 40 Cc.—Prof. D. P. D. Wilkie, B.M.J., ii./25,1046 (*now revised v. postea*).

At the Peter Bent Brigham Hospital the intravenous method was used with 60 patients, 8% of whom showed reactions severe enough to cause headache, nausea, and vomiting, but in no case dangerous. A dilution of 2·5 Gm. in 50 Cc. for a 10-stone man advised, diluted to 125 Cc. at time of use.—L. R. Whitaker, Jl. A.M.A., Jan. 23, '26,239. See also W. H. Martindale, L. i./26, 416. *Yet it must not be forgotten that diminution in strength may be conducive to hydrolysis.*

Intravenous injections disastrous to patient.—W. H. Stewart, Jl. A.M.A., Feb. 6, '26,443.

Of the 67 cases in which the dye was given intravenously, 15 showed a normal reaction, 26 incomplete, 25 no shadows, and one patient suffered so severe a reaction with Tetrabromphenolphthalein that no films were taken. —Per Jl. A.M.A., Mar. 13, '26,805.

Tetrabromphenolphthalein appears more dangerous than the Iodo- compound, and intravenous injection should usually be replaced by oral use.— Société Belge de Radiologie, per Jl. A.M.A., Apl. 17, '26,1230.

Many roentgenologists have abandoned the intravenous method because it is generally followed by varying degrees of reaction. The danger of injuries to the peripheral vessels is a serious one. If comparable results may be achieved by the oral method, why subject patients to the discomforts and dangers of intravenous injections ?—L. Levyn, Discussion Med. Soc. State of N. York, per Jl. A.M.A., May 1, '26,1379.

London Med. Soc.—Expressions of opinion. Intravenously severe reactions. Method abandoned.—Sir H. Rolleston. Perfected technique needed.—R. Knox. Against the intravenous method for diagnosis.—Sir Wm. Willcox.—B.M.J. i./26,374,; L. i./26,441.

Schöndube, though an advocate of the intravenous method, admits thrombi in 8% of cases. Hæmolysis following the injection is possibly the cause of thrombosis. Strauss and Pribram considered the dangers exaggerated. Gotthart emphasised the need for caution in patients with exophthalmic goitre.—Discussion Germ. Ront. Soc., per Jl. A.M.A., June 26, '26,1995.

The Bromo- compound not considered safe intravenously, but the Iodo- compound used in 72 cases without severe reaction.—Reeves and Field, Jl. A.M.A., July 24, '26,275.

Oral use never gives as good results as intravenous. It gives also far less information as regards function of the gall-bladder, as the shadow appears much later, lasts a shorter period, and is never as dense. Rate of absorption (with the oral method) is extremely variable and owing to the laxative action of the Phenolphthalein a good deal of the dye is lost. A negative result after oral use is therefore of no value, but on the other hand, after intravenous injection is definite evidence of disease. In 2 consecutive cases toxic results followed injection of 4½ Gm. Pulse of the wrist could not be felt for ¾ hour.—Stanford Cade, L. ii./26,1.

Report of fatal case following use of Tetraiodophenolphthalein. 5½ Gm. in 40 Cc. of water injected intravenously over a period of 20 minutes.—B.M.J. ii./26,864. Oral route should be used in preference to intravenous. Extravasation during injection may lead to serious local effects.—L. ii./26,510; see also B.M.J., ii./26,542,613.

Analogy with a solution of Sodium Carbolate.—W. H. M., B.M.J., ii./26,620.

The largest dose given by Graham and his Co-workers was 3½ Gm., and usually not more than 3 Gm. (never more than 0·06 Gm. per kilo). Best to give in two doses at ½-hour interval.—E .A. Graham, B.M.J., i./27,41.

B.M.A. DISCUSSION ON SOME RECENT DEVELOPMENTS IN OUR KNOWLEDGE OF THE BILIARY TRACT (with extensive bibliography). Prof. E. A. Graham stated that Cholecystography with the Iodo- body at first gave severe toxic reactions: he had resorted to the Bromine: and then reverted to the Iodine body, after making it 'free from toxic impurities.' In a certain number of cases after intravenous injection toxic reactions still occurred, and more after oral administration of the drug. Prof. D. P. D. Wilkie considered it an extremely valuable aid to diagnosis and agreed that intravenous method gave most accurate results, but that very great care was necessary to prevent reactions. Males more immune from reaction than females. T. Izod Bennett used the oral method exclusively with most satisfactory results: it avoided 'bad arms' due to thrombo-phlebitis. Water should be given in abundance. J. H. Anderson had given up intravenous in favour of oral method and had no alarming after-effects. Prof. Graham in reply said he had had occasional cases of thrombo-phlebitis, but he hoped to do away with this by improving the drug. C. F. W. Illingworth expressed the view that until complete absorption of the Iodo- compound from the intestine can be ensured accurate results can be hoped for only by intravenous injection. A modification of the technique used was the giving a few hours before the injection of a **large dose of Magnesium Sulphate,** to secure the emptying of the gall-bladder and ducts, which are then refilled by the fresh dye-laden bile from the liver. The absence of a gall-bladder shadow is strong evidence of a gross disease, but cannot be expected to give evidence of minor pathological changes. In jaundiced patients the investigation is of no value. Further discussion by F. A. Knott, J. W. McNee, and others.—L. ii./26,234; B.M.J., ii./26,682.

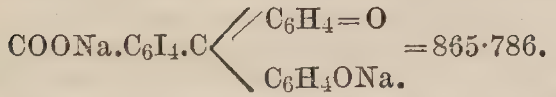
Rise in temperature and lighting up of cholecystitis immediately following intravenous injection of 30 Cc. of Sodium Tetraiodophenolphthalein solution. —E. A. Crook, L. i./27,1268.

The dose of 5·5 Gm. intravenously, originally used, is now agreed to be unnecessarily large, ***sufficiently good shadows being obtained with 3 or 4 Gm.*** A fatal case recorded from the use of the large dose. It is of great importance that the solution (40 Cc.) should be freshly prepared and injected slowly and with care. In the evening, 24 hours before injection, a dose of Licorice Powder is given, and the following day a skiagram of the upper Abdomen taken. At 9 p.m., 3.5 Gm. of the Iodo- compound in 40 Cc. Distilled Water is given slowly into the median basilic vein and at 9 a.m. the next day a skiagram is taken. A small Barium meal is then given, and as the Barium is escaping into the duodenum another skiagram is taken to illustrate the relation of shadows of gall-bladder and duodenum. At 1 p.m. a fat-containing meal is given and at 3 p.m. a final radiogram is taken, to show the emptying power of the gall-bladder. Data obtained in this way was confirmed in 132 out of 158 cases. In no case were the toxic symptoms alarming and 93 cases were free from any symptoms.—D. P. D. Wilkie and C. F. W. Illingworth, B.M.J., i./27,613.

The ***time*** for attainment of a cholecystographic shadow of maximum density can apparently be ***shortened by one-half*** by giving 1 Gm. **Tolysin** *per os* prior to the injection of the Sodium Tetraiodophenolphthalein. —R. G. Spurling and E. E. Hartman, Jl. Ph. & Exp. Ther., Dec. '26,190.

New and Non-official Remedies (U.S.A.) ref.—Jl. Am. M.A., Sept. 26, 1925, p. 975.

Sodium Phenol-Tetraiodophthalein.



$$\mathrm{COONa.C_6I_4.C}\left\langle\begin{array}{l}\mathrm{C_6H_4=O}\\ \mathrm{C_6H_4ONa.}\end{array}\right. =865{\cdot}786.$$

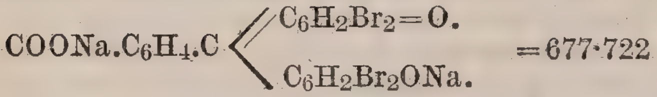
Preliminary tests show that this compound (isomeric with that with which the bulk of the work has been done) can be employed in a dose of 0·055 Gm. per kilo intravenously for Cholecystography (but Graham—B.M.J., i./27,41—says suitable dose is 0·04 Gm. per kilo, and it was never found necessary to give more than 2.5 Gm. to an adult). The excretion through the liver is more rapid than with Sodium Tetraiodophenolphthalein, shadows of maximum intensity often being obtained in *four hours.* With this new salt tests for *hepatic function* can be simultaneously carried out by the Rowntree and Abel method, as with Phenoltetrachlorphthalein, and by a calorimetric estimation of it in the urine it may be possible to perform also a test for renal function.—E. A. Graham and others, Jl. A.M.A., Feb. 13, '26,467, B.M.J., ii./26,671.

The use of Phenoltetraiodophthalein followed by fewer and much less severe toxic reactions than the original body and the danger of thrombo-phlebitis is reduced.—E. A. Graham and Co-workers, Jl. A.M.A., June 19, '26,1899.

In a cholecystographic study of 1,246 patients (by E. A. Graham) the original X-Ray diagnosis was confirmed in 143 out of 147 cases. Graham prefers the intravenous method, as giving greater accuracy, and Phenoltetraiodophthalein, as being most satisfactory from the standpoint of toxicity. He uses ampoules containing individual doses of the crystals as a safeguard against oxidation—B.M.J.E., i./27,81.

Phenoltetrachlorphthalein as liver function test, and the *Bromsulphalein Test* are dealt with in *Vol. II.*

Sodium Tetrabromphenolphthalein. *Syn.* BROMO-RAY, BROMEIKON.



$$COONa.C_6H_4.C \left\langle \begin{matrix} C_6H_2Br_2{=}O. \\ C_6H_2Br_2ONa. \end{matrix} \right. = 677{\cdot}722$$

This compound is a pale mauve powder readily soluble in distilled water. Both the powder and solutions should be preserved from the action of the air, as Carbon Dioxide is slowly absorbed, with formation of the white insoluble Tetrabromphenolphthalein by decomposition of the coloured salt. Solutions can be sterilised by heating in a boiling water-bath, but it seems quite unnecessary to do so.

The Iodo- compound (Iodo-Ray) *v. antea* is much more generally used.

Dose.—The dose *per os* is from 4 to 7 Gm., according to weight of the patient, the average dose being about 5 Gm. It is given as **Slipules** containing ½ to 1 Gm. during the evening meal, frequent draughts of water being taken. The Slipules are preferably given two or three at a time at short intervals. X-Ray pictures are taken 12, 15, and 20 hours afterwards.

Oral Use.

In the early work at the Mayo Clinic with this compound given by the mouth 800 patients were treated with doses in ordinary capsules, containing 1 Gm. or ½ Gm., during the evening meal, with instructions to take frequent draughts of water. Roentgenograms were taken at 8 a.m. the following day as mentioned. Reactions were relatively few, only a few complaints of nausea being made, a few patients vomited, and in rare instances catharsis occurred.—R. D. Carman, L. ii./25,67.

Intravenous use (not now advised).

The following is the original method proposed by Graham and Cole:

Two doses, each containing 2·5 Gm. in 40 Cc. of distilled water, are administered in the morning between 7.30 and 9 a.m. For a patient of less than 52 kg. the dose should be reduced.

A few Cc. of Normal Saline should be injected after the dye to prevent leakage through the vein wall.

Orders given to patient:—

(1) Omit breakfast. (2) Omit lunch, or only take glass of milk. (3) Take 40 grains of Sodium Bicarbonate every 3 hours for 48 hours, day and night, while awake. (4) Lie on right side of abdomen, or be up. (5) Take water, if desired, by the mouth. (6) Omit proteins from evening meal on day of injection.

X-Ray films should be taken at 4, 8, 24 and 32-hour periods; no special technique is necessary. The omission of breakfast is important.

A normal gall-bladder begins to cast a shadow from 3½—5 hours after the injections, when it shows a tendency to change in size. It casts its heaviest shadow between 16 and 24 hours, and is empty in 48 hours. The shadow shown on the 4 or 8-hour plate is invariably larger than subsequent shadows. So far, all gall-bladders failing to show this "elasticity or distensibility" at some time during the series have been found to be pathologic on operation, or give a clinical finding of gall-bladder disease. Pathological bladders do not cast such heavy shadows as normal ones.

Of 4 cases in which there was no shadow, 2 had a stone occluded in the cystic duct, one had a bladder too small owing to disease, and the fourth had an appendical abscess containing pus.

On a large proportion of the patients the treatment had no ill-effects except that of transient nausea lasting from 10 to 15 minutes.—Graham and Cole, Jl.A.M.A., Vol. 82, '24,1777.

No serious symptoms, but unpleasant reactions, such as pains in the back, giddiness, nausea, vomiting, cyanosis, coldness, or "queer feelings," were occasionally experienced. Serious symptoms can be avoided by slow injection. In only one of 10 patients operated on were the surgeon's findings at variance with the radiological deductions. In estimating the value of Graham's method, it should be borne in mind that only a maximum of 35 to 40% of gall stones show evidence of their presence by the ordinary method of direct radiography, that a negative finding by the ordinary method does not exclude the presence of gall stones, and that 'gall stones are incidental and not essential to a cholecystitis which may necessitate surgery.' Of value as a diagnostic.—R. E. Roberts and H. Cohen, B.M.J. ii./25,54.

The Bromine salt intravenously seems more provocative of systemic reactions. Preference given to oral use of Bromine salt, with the Iodo- compound to check doubtful cases.—R. D. Carman, L. ii./25,67.

Empty the gall-bladder before injection: Pituitary Extract answers requirement perfectly. Atropine prophylactically.—D.M.W., Aug. 28, '25, per Jl. A.M.A., ii./25,1171.

The compound intravenously produced such a reaction that its use was not considered safe.—Per Jl. A.M.A., July 24, '26,275.

See also the abstracts under the Iodo- compound for comparisons.

PHOSPHORUS (*B.P.* '14), U.S.

P=31·027.

Ⓟ*In Irish Free State and Northern Ireland: Phosphorus and all preparations (and admixtures, Northern Ireland) containing it in a free state.*

Dose.—$\frac{1}{100}$ to $\frac{1}{20}$ grain **(0·0006 to 0·003 Gm.).** Max. single dose (*B.P.* '14) $\frac{1}{25}$ grain, Fr. Cx. $\frac{1}{64}$ grain. Max. during 24 hours $\frac{1}{32}$ grain.

Phosphorus is obtained by converting Calcium Phosphate (of bones) into the soluble Superphosphate by heating with Sulphuric Acid; this is reduced to metaphosphate by heating with charcoal and finally by further heat is converted into normal Calcium Phosphate with evolution of vaporised Phosphorus.

A poisonous, non-metallic element melting at 110° F., igniting at a slightly greater heat, and forming white fumes of phosphoric anhydride.

German Shells contained Phosphorus, yellow and red.—B.M.J.i./15 259. Capable of producing localised gangrene and anaerobic bacterial infection more barbarous than expanding bullets. We had occasion to examine a shell of this kind ourselves—it contained the red variety.

Antidotes.—Give Copper Sulphate 3 grains every five minutes (see Antidotes to Poisons), or Hydrogen Peroxide ½ drachm in 1 ounce of water, repeated every 15 minutes. Potassium Permanganate 1% solution *per os* is also good chemically, or Magnesium Sulphate ½ ounce. Give demulcents. Previously French Oil of Turpentine was advised, but Oils in general are unsuited.

Inject normal saline solution and give alkalis as soon as the vomiting and purging subside.

Matches.—The use of Yellow Phosphorus is prohibited in Great Britain, Germany, etc. "Strike-anywhere" matches usually contain Tetraphosphorus Trisulphide.

Safety Matches contain an oxidising mixture (Potassium Chlorate, Manganese Dioxide, Lead Peroxide PbO_2, etc.) on the match and Red Phosphorus on the box.

Necrosis of jaw bone caused by work in PHOSPHORUS MATCH WORKS. There are two types known as phosphorisme (anæmia, albuminuria and fragility of bones) and 'Phossy jaw.' Scarlet Phosphorus sets up acute structural changes in the brain.—Sir T. Oliver, B.M.J., ii/21,111.

Phosphorus necrosis, in consequence of the introduction of the Sesquisulphide method of making matches, has entirely disappeared.—Sir Thos. Oliver, Industrial Legislation and Hygiene, B.M.J., ii./25,530.

Soluble about 1 in 320 of absolute alcohol, about 1 in 200 of ether, about 1 in 25 of chloroform, about 1 in 100 each of oleic acid, almond, olive, castor, theobroma oil, and suet; in half its weight of carbon bisulphide, almost insoluble in water; combines chemically with oils of turpentine and peppermint, forming non-luminous and comparatively non-poisonous liquids.

Uses.—Phosphorus has been given as a nervine stimulant in various affections of the central nervous system and in neuralgia; and in leucocythæmia, and some skin diseases.

There is no evidence that the central nervous system is ever in a condition of phosphorus starvation. The evidence that phosphorus retention is increased by giving organic and inorganically combined phosphorus is conflicting.—B.M.J. ii. 10,1598.

N.B.—Preparations should be recently made and kept from light.

Elixir Phosphori.

Add Compound Tincture of Phosphorus 1, to Glycerin 4.

Dose.—15 to 60 minims (**1 to 4 Cc.**) in water. Contains $\frac{1}{50}$ grain in one drachm. A palatable well tolerated 'fluid' form of Phosphorus.

Oleum Phosphoratum (*B.P.* '14).

Dose.—1 to 5 minims (**0·06 to 0·3 Cc.**), on sugar or in perles.

Contains about 1% (by weight) of Phosphorus in prepared almond oil. (*B.P.* '14 is flavoured with Lemon Oil.)

Flavoring.—Emulsified and Glyl Rosæ added, taste is covered but more usually given in **Perles** or **Pills.**

ORIENTAL SORE.

Best results in old intractable cases with extensive ulceration, the oil being dabbed on after removing the scab, every other day. When ulcerative process not well developed and lesion is nodular, inject 3 to 5 m. hypodermically round or into nodule once or twice weekly; injection practically painless. No general reaction and local reaction slight, but signs of acute inflammation occasionally develop. The delayed action of Phosphorus on the liver should be kept in mind.—A. Castellani, Jl. Trop. Med., Nov. 2, '25,377. See also *ibid.* June 1, '23,194.

RICKETS and OSTEOMALACIA and certain cases of very chronic MALARIAL CACHEXIA: In these as an adjuvant to Quinine and Arsenic, a dilute preparation of ½ m. Phosphorated Oil in 5 m. diluent is used.—B.M.J., i./23,283.

Phosphorus Solutus P.G. VI.

Dose.—Max. single 3 minims (**0·2 Cc.**): *pro die* 10 minims (**0·6 Cc.**).

Heat Liquid Paraffin 194 by weight 10 minutes at 150° C. Cool to about 60° C. and dissolve Phosphorus 1 (cleaned from external layer and free from water) by shaking in a stoppered bottle. Allow to cool and add Ether 5 by weight. *Oleum Phosphoratum P. Svec.* X. is Phosphorus 1, Liquid Paraffin 94, Ether 5.

Perles of Phosphorus. Contain $\frac{1}{100}$, $\frac{1}{65}$, and $\frac{1}{32}$ grain.

Phosphorated Cod Liver Oil Capsules. *Dose.*—1 to 4.

Prepared by diluting Phosphorated Oil, B.P. '14, with Cod Liver Oil. Contain one-half drachm, each equivalent to $\frac{1}{100}$ grain.

Rickets well treated by Phosphorated Cod Liver Oil.—E. Pritchard, B.M.J. ii./19,627.

Pilula Phosphori (*Martindale*).

Dose.—1 to 3 grains (**0·06 to 0·2 Gm.**).

Phosphorus 1 and Oil of Theobroma *q.s.* to 100.

Heat the oil to 150° C. and sustain the heat for 5 minutes. Strain and weigh 99 into a wide-necked bottle with an india-rubber cork, and when cooled to 65° C. add the Phosphorus, cork and shake well till the fat begins to solidify. In rolling it into pills, divide into suitable lots, and beat each in a mortar to render it plastic before applying it to the machine, then work off quickly and cover with sandarach solution. The mass contains 1% of Phosphorus in perfect solution. A few drops of chloroform added during manipulation checks oxidation. When phosphorus is to be combined with other ingredients in a pill, the following is best used :—

Sevum Phosphoratum, 10%. (*Martindale*).

Phosphorus 1, Pure Carbon Bisulphide 5. Dissolve and add Prepared Mutton Suet 9. (**Sevum Præparatum,** is the purified internal fat of the sheep, M. pt. 45 to 50° C., prepared by melting and straining. **Sevum Benzoatum** is the same digested with 3% Benzoin at 60° C. *B.P.* '14.)

Add a little of the suet at first, mix quickly, add the remainder, mix thoroughly and allow the bisulphide to evaporate. May be used to make the following pills. They are perfectly stable as there is no interaction or decomposition.

Pilula Phosphori ($\frac{1}{50}$ grain) **cum Ferro** (3 grains).

Phosphorated Suet 10 grains, Reduced Iron 150 grains, Compound Tragacanth Powder 10 grains, Chloroform 15 minims. Mix, and add quickly, Mucilage of Acacia *q.s.*

Divide into 50 pills (or into 750 pills if the quantities be taken in grammes). Cover with Sandarach Solution. They are also made with Ⓟ **Nux Vomica** ($\frac{1}{3}$ grain).

Pilula Phosphori ($\frac{1}{50}$ grain) **cum Quinina** (1 grain).

Phosphorated Suet 10 grains, Quinine (base) 38 grains (=50 grains Sulphate), Chloroform 20 minims. Mix quickly, and add Compound Tragacanth Powder 10 grains, Mucilage of Acacia *q.s.*. Mix, and divide into 50 pills (or into 750 pills if the quantities be taken in grammes). These pills are also made with **Reduced Iron** 3 grains, and with **Reduced Iron** (3 grains) and $\boxed{\text{P1}}$ **Strychnine** ($\frac{1}{40}$ grain).

P1 **Pilula Phosphori** ($\frac{1}{50}$ grain) **cum Strychnina** ($\frac{1}{40}$ grain). Prepare as Pilula Phosphori cum Quinina, with Strychnine $1\frac{1}{4}$ grains *vice* Quinine 37 grains. These are also made with **Reduced Iron** (3 grains).

Dose.—Any of the above pills are best taken directly after meals.

Tinctura Phosphori Composita. *Adopted by B.P.C. Dose.*—3 to 12 drops on sugar.

Phosphorus 1, Chloroform 85. Warm gently in a stoppered bottle till dissolved, and add the solution to Absolute Alcohol to 500. Shake well and keep in the dark. Becomes acid on keeping.

Phosphorus Pentachloride. PCl_5 = 208·34. ***Manufacture.***—Pass chlorine *q.s.* into a cooled solution of phosphorus 1 in carbon disulphide 4 until a portion removed no longer gives phosphorescent residue when evaporated on paper. Then remove the carbon disulphide by filtration with aid of reduced pressure, *e.g.* water pump. A yellowish white crystalline mass fuming in moist air, employed chemically in numerous reactions, for example substitution of hydroxyl groups with chlorine.

Zinci Phosphidum, Zn_3P_2=258·194.

Dose.—$\frac{1}{20}$ to $\frac{1}{3}$ grain (**0·003 to 0·02 Gm.**) in **Pill.** FR. CX.—Max. single dose $\frac{1}{8}$ grain; Max. during 24 hours $\frac{1}{4}$ grain approx.

A grey powder. With acids yields phosphoretted hydrogen.

Phosphorus Determination in Vermin Killers.—Y.B.P. 1919, 124.

Acidum Hypophosphorosum, U.S. X. H_3PO_2=66·051.

Dose.—2 to 5 minims (**0·12 to 0·3 Cc.**).

A colourless liquid, strength 30 to 32%.

On heating, water evaporates and the acid decomposes at 130° to 140° C., forming hydrogen phosphide, which ignites, and phosphorous acid. The latter decomposes at 160° to 170° C. into hydrogen phosphide and phosphoric acid finally the last portions of unoxidised phosphorus burn out at a higher temperature (U.S.).

Hypophosphites. There is no reliable evidence that they exert a physiological effect or influence any pathological process.—Jl. Am. Med. Assn., per P.J. i./16,247.

Acidum Hypophosphorosum Dilutum.

Average dose.—8 minims. 10% strength. Sp. Gr. 1·042 at 25° C.

Uses.—Its Salts are mostly employed. It may be added to Syrup of Ferrous Iodide to preserve same.

Method for the determination of a Hypophosphite.—P.J. i./12,12.

Ammonii Hypophosphis. $NH_4.H_2PO_2$=83·083.

Dose.—1 to 6 grains (**0·06 to 0·4 Gm.**).

In white deliquescent tabular crystals, soluble 5 in 6 of water. Insoluble in alcohol. It has a nauseous saline taste. ***Incompatible*** like the Calcium Salt. Nervine tonic.

Calcii Hypophosphis. $Ca(H_2PO_2)_2$=170·156.

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**).

White crystalline salt, with nauseous taste, soluble 1 in 7 of water. Prepared by heating phosphorus with milk of lime until phosphoretted hydrogen ceases to be given off, then filter and evaporate to crystallise or precipitate with alcohol.

Incompatible with oxidising agents.

Uses.—Nervine tonic and aphrodisiac. Checks night sweats of phthisis, and is used in acne. In epilepsy has proved serviceable.

Mistura Calcii Hypophosphitis.

Calcium Hypophosphite 5 grains, Saccharated Lime Solution 1 drachm, Peppermint Water to 1 ounce.

Barii Hypophosphis. $Ba(H_2PO_2)_2=267{\cdot}456$.

Dose.—$\frac{1}{4}$ to 1 grain (**0·016 to 0·06 Gm.**).

White crystalline salt soluble in water $3\frac{1}{2}$. Prepared in manner analogous to the above and its properties are similar.

Ferri Hypophosphis. $Fe(H_2PO_2)_3=250{\cdot}969$.

Syn. FERRIC HYPOPHOSPHITE

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**) in a pill.

In commerce is a whitish amorphous powder with a chalybeate taste slightly soluble in water, but more so in presence of Potassium Citrate.

Liquor Ferri Hypophosphitis Fortis, B.P.C.

Dose.—10 to 30 minims (**0·6 to 2 Cc.**).

Dilute 23 of Solution of Ammonia with equal volume of Distilled Water, gradually add Solution of Ferric Sulphate 14·2 previously diluted with an equal volume of water; wash the precipitate by decantation with Distilled Water until free from Sulphates, collect on calico, drain and transfer to a porcelain dish. Add Citric Acid 7·6 and Water 20, heat on a water-bath, with occasional stirring until clear, and then add Sodium Hypophosphite 9·6, and continue heating with stirring about one minute, or till a clear greenish solution results. Add Sodium Citrate 6·6, filter, and pass sufficient Chloroform Water (1 in 200) through the filter to make volume up to 100.—P.J. i./07,102

P1 **Pilula Ferri Hypophosphitis cum Strychnina.** Strychnine $\frac{1}{30}$ grain, Ferrous Hypophosphite 2 grains. To make one pill (or in grammes to make 15). *Dose.*—1 twice or thrice daily.

Magnesii Hypophosphis—$Mg(H_2PO_2)_2 . 6H_2O = 262{\cdot}502$.

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**). White crystalline salt soluble in water, about 1 in $4\frac{1}{2}$.

Potassii Hypophosphis, $KH_2PO_2=104{\cdot}139$.

Dose.—1 to 6 grains (**0·06 to 0·4 Gm.**).

A deliquescent granular white powder, having a nauseous, bitter taste. Soluble 1 in 1 of water. Incompatible as the Calcium Salt.

Flavoring.—Syl Aurantii Floris; Glyl Rosæ, Elixir Simplex.

Sodii Hypophosphis (*B.P.* '14). $NaH_2PO_2=88{\cdot}04(+H_2O$ Ph. Ned. V.).

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**).

A white granular deliquescent salt, with a bitter, nauseous taste. Soluble 1 in 0·63 of water, and freely soluble in alcohol. Explosive with an equal weight of Sodium Nitrate. See also Calcium Salt.

Uses.—In phthisis, and as nutrient in wasting diseases generally.

Flavoring.—Syl Sassafras, Syl Lavandulæ, Syl Amygdalæ Amaræ; Syrupus Aromaticus.

Ⓟ**Syrupus Hypophosphitum Compositus,** U.S. VIII.

Average dose.—2 drachms (**8 Cc.**).

Ferric and Manganese Hypophosphite, of each 2·25, with Sodium Citrate 3·75 are first dissolved in water 30, then Calcium 35, Potassium 17·5, and Sodium Hypophosphites 17·5 are dissolved in water 400, with Diluted Hypophosphorus Acid 5. Quinine (base) 1·1 and Strychnine (base) 0·115, with Hypophosphorus Acid 10 are then dissolved in water 30. Finally, Sugar 775 is dissolved in the mixed solutions and made up to 1,000 with water. Chloroform 1 in 500 added we find improves its keeping qualities. It contains approximately $\frac{1}{120}$ grain of Strychnine Hypophosphite in a drachm.

In phthisis and like cases, hypophosphites raise the nervous power and improve condition of the secretions. They are given in sufficiently large doses for at least 6 months.

Ⓟ**Tablets of Compound Hypophosphites** each weighing 2 and 4 grains and equivalent to ½ and 1 drachm of the above are prepared.

Ⓟ ***Fellows' Compound Syrup of Hypophosphites** (T.M. 20267) is stated to contain in 100 Gm., Potassium, Manganese and Calcium Hypophosphites each 1·2 Gm., Iron Hypophosphite 1·4 Gm., Quinine Hypophosphite 1·0 Gm., Strychnine Hypophosphite 0·02 Gm.

Dose.—Medium Adult, 1 drachm. Children in proportion.

Ⓟ**Pulvis Hypophosphitum Compositus.** *Dose.*—1 to 4 grains **(0·05 to 0·25 Gm.).**

Calcium Hypophosphite 37½, Sodium Hypophosphite 20, Manganese Hypophosphite 2½, Quinine Hypophosphite 1½, Strychnine Hydrochloride Trituration *q.v.* 1⅓, Iron Hypophosphite 2½, Milk Sugar to 100. Five grains =$\frac{1}{155}$ grain Strychnine Hydrochloride, approx. *i.e.* 1 drachm of the U.S. VIII. Syrup.

Ⓟ**Glycerol Hypophosphitum, Glycerol of Hypophosphites.** *Dose.*—1 drachm **(4 Cc.).**

Dissolve Calcium Hypophosphite 160 grains, Manganese Hypophosphite 80 grains, Potassium Hypophosphite 160 grains, Quinine Hypophosphite 80 grains, Strychnine Hypophosphite 2½ grains in Distilled Water 3 ounces, and add Strong Solution of Ferric Hypophosphite (B.P.C.) 4 ounces, Hypophosphorus Acid 2 drachms, Glycerin to produce 20 ounces. Each drachm contains Strychnine Hypophosphite $\frac{1}{64}$ grain, and Quinine Hypophosphite ½ grain.—P.J. i./06,385.

Care must be taken to distinguish the above preparations which contain strychnine from the following preparation which contains none:—

Syrupus Hypophosphitum, U.S.IX. had Hypophosphite of Calcium 45, of Potassium 15, of Sodium 15 with diluted Hypophosphorous Acid 2, Sugar 600, Glycerin 50, Water *q.s.* to 1,000. *Average dose.*—2½ drachms.

PHYSOSTIGMATIS SEMINA.

Calabar Bean (B.P. 1898). *Syn.* ORDEAL BEANS, from West Africa. *Dose, in powder.*—1 to 4 grains.

History of introduction of the drug.—Gordon Sharp, P.J. i./16,619.

The poisonous properties of the ripe seed of *Physostigma venenosum* (*Leguminosæ*) are chiefly due to Physostigmine, which is contained in the cotyledons only, the content being about 0·25%.

Details of other constituents: Edn. XVII., p. 640.

Antidotes.—Emetics, Atropine or Belladonna, Chloral, Strychnine, Tannin. Potassium Permanganate 10 grains in 1 pint of tepid water, by stomach tube, repeated in ½ hour. Stimulants freely.—Murrell.

Therapeutic doses of Physostigmine are incompatible with those of Atropine and Hyoscine and observations on man and animals suggest that large therapeutic doses of Atropine or Hyoscine are capable of preventing death from Eserine. A fatal intramuscular dose of Physostigmine Salicylate in the cat is stated to be 0·001 Gm. per kilo.—S. Weiss, Jl. Ph. & Exp. Ther., Apl. '26,188.

Uses of Physostigma.—Preparations of Physostigma and solutions of its alkaloid Physostigmine ¼ to 1%, applied topically to the eye, contract the pupil, and are antagonistic to atropine.

As a myotic the solution acts in 5 to 15 minutes and the pupils remain contracted for 12 hours. It is employed to overcome the over dilatation caused by Atropine, Homatropine and Cocaine.—G. Sharp, P.J. i./16,619.

Traumatic tetanus has been well treated with extract $\frac{1}{8}$ grain every hour then $\frac{1}{2}$ grain every 2 hours; or give Physostigmine hypodermically, and increase every hour, so as to paralyse, little short of arresting, the breathing. For chorea also it is given in smaller doses. In paralysis it arrests muscular wasting and improves muscular power. In hemiplegia or paraplegia. give doses of $\frac{1}{30}$ to $\frac{1}{10}$ grain of extract frequently.—R.

Ⓟ**Extractum Physostigmatis** (B.P. 1898).

Dose.—$\frac{1}{4}$ to 1 grain (**0·016 to 0·06 Gm.**).

An alcoholic extract containing three-fourths of its weight of milk sugar. Yield about 2 to 5%.

Ⓟ**Tinctura Physostigmatis** B.P.C.

Dose.—5 to 15 minims (**0·3 to 1 Cc.**)

Calabar Bean, in No. 40 powder, 1, Alcohol 90% *q.s.* to 5.

It is antagonistic to strychnine, but is *not* to be depended on as a remedy for poisoning by nux vomica or strychnine.

P1**Physostigmina.** *Syn.* ESERINE.

$C_{15}H_{21}N_3O_2 = 275·192$.

Dose.—$\frac{1}{100}$ to $\frac{1}{50}$ grain (**0·0006 to 0·0013 Gm.**).

In colourless crystals, slightly soluble in water, freely in ether, soluble 1 in 180 of vaseline. Solution in castor oil, $\frac{1}{2}$ to 1% (by weight), keeps well for ophthalmic use.

Myotic activity of Eserine mainly due to the Urethane group on the molecule.—E. Stedman, Biochem. Jl., Vol. XX., No. 4, 719.

Ⓟ**Unguentum Physostigminæ, R.O.H.**

Physostigmine 0·25, Soft Paraffin 100; heat to dissolve.

P1**Physostigminæ Salicylas,** U.S., P. AUSTR., FR. CX., P.G.VI.

$C_{15}H_{21}N_3O_2.C_6H_4.(OH)\ COOH = 413·24$.

Dose.—$\frac{1}{60}$ to $\frac{1}{20}$ grain (**0·001 to 0·003 Gm.**).

In needle-shaped or columnar crystals. Soluble 1 in 140 of cold water; much used as a myotic in solution. Not so liable to turn pink as that of the sulphate.

Ⓟ**Tablets, Hypodermic** $\frac{1}{100}$ grain.

To open the bowels in acute abdominal conditions $\frac{1}{100}$ grain hypodermically until 6 doses have been given (four hourly). This dose is safe—higher dose may act too severely and necessitate bismuth and opium to check the resulting diarrhœa. If no action give a turpentine enema the following day. The muscular coat of the intestine is directly stimulated by Eserine.

P1**Physostigminæ Sulphas.** **P.G. VI., Ph. Ned. V.**

$(C_{15}H_{21}N_3O_2)_2\ H_2SO_4 = 648·464$.

Dose.—$\frac{1}{60}$ to $\frac{1}{20}$ grain (**0·001 to 0·003 Gm.**). (*B.P.*'14 $\frac{1}{64}$ to $\frac{1}{32}$ grain).

In yellowish granular crystals, deliquescent and soluble about 4 in 1 of water. Solution becomes pink, but does not lose much in efficacy.

In doses of $\frac{1}{100}$ grain (**0·0006 Gm.**) of value in tympanites as occurring in typhoid fever.

Ⓟ**Guttæ Physostigminæ** R.O.H. 0·062, 0·125, 0·25, 0·5 or 1%.

St. Th. H. 0·5, or 1%. St. M.'s H. 0·5%.

In glaucoma the 0·5 to 1% drops are suited for prolonged use.

The 1% solution instilled two or three times a day is of value. It contracts the pupils and greatly improves vision.—Jl. Trop. Med., Sept. 1, '26,303.

𝔇 P1 **Guttæ Physostigminæ cum Cocaina, R.O.H.**
Physostigmine Sulphate 0·25, and Cocaine Hydrochloride 1, Water to 100. 𝔇 P1 St. M.'s H. 0·25 and 1·25 respectively in 100.

Ⓟ **Guttæ Physostigminæ et Quininæ.** Liverp'l Eye and Ear Inf.
Physostigmine Sulphate 1 grain, Quinine Sulphate (Bisulphate) 4 grains, Distilled Water 1 ounce.

Ⓟ **Injectio Physostigminæ Sulphatis Hypodermica.** 1%. *Dose.*—1 to 4 minims (**0·06 to 0·24 Cc.**).

Ⓟ **Lamellæ Physostigminæ (Sulphatis).** (*B.P.* '14). R.O.H.
Each contains $\frac{1}{1000}$ grain (**0·000065 Gm.**); also prepared containing $\frac{1}{250}$ grain and $\frac{1}{500}$ grain respectively, for ophthalmic use. Also 𝔇 P1 $\frac{1}{1000}$ grain, combined with Cocaine $\frac{1}{200}$ grain.

Ⓟ '**Sterules**' of Physostigmine Sulphate Solution 4 grains to the ounce are prepared, also 𝔇 P1 '**Sterules**' of Physostigmine Sulphate, 1 grain with Cocaine Hydrochloride 4 grains to the ounce.

Ⓟ **Unguentum Hydrargyri Oxidi Flavi cum Physostigmina.**
Physostigmine 0·25, Soft Paraffin or Lanoline (anhydrous) 100; heat till dissolved, and add, when cold, Yellow Mercuric Oxide 1.

For corneal ulcers in scrofula, solution of 2 grains to an ounce may be dropped into the eye; also in mydriasis and glaucoma.

Diagnosis of glaucoma, a lecture on—Lieut.-Col. R. H. Elliott, B.M.J. i./20,279.

Eserine occasionally produces toxic symptoms.—H. Herbert, per Pres., Sept. 20, 310.

Ⓟ **Mistura Eserinæ Composita L.H.**
Dose.—$\frac{1}{2}$ ounce (**15 Cc.**).
Eserine Sulphate $\frac{1}{48}$ grain, **Tincture of Nux Vomica 10 minims, Compound Infusion of Gentian to** $\frac{1}{2}$ ounce.

Ⓟ **Tablets of Eserine with Truneck's Serum** (*q.v.*).
No. I. contain 0·00025 Gm. Eserine in each, with the salts of 50 Cc. of Trunecek's Serum.
No. II. contain in addition to the constituents of No. I. atropine 0·00005 Gm. each, for use in the severest forms of intestinal inaction and in obese diabetic patients. Both forms of Tablets weigh 8 grains (0·5 Gm.) each.
Eserine is given in this way, with or without atropine, for diabetes, on the supposition that the disease is due to arteriosclerosis of the pancreas.
Maximum dose of either—6 tablets per diem.

Eserine $\frac{1}{4}$ grain given *intravenously* by mistake caused great flow of saliva and incontinence of urine and fæces. Atropine and Strychnine and Oxygen given. Temporary blindness and deafness. Ultimate recovery.—B. L. Slater, B.M.J. ii./22,1120.

P1 PILOCARPINA, $C_{11}H_{16}O_2N_2$=208·144. Fr. Cx.

An alkaloid obtained (0·5%) from Pilocarpus microphyllus (Maranham Jaborandi) and other varieties. Jaborandi was introduced into Britain by the late W. Martindale. Easily soluble in water. Soluble in alcohol, ether, chloroform and benzol.

For details of Assay, see Vol. II.

Uses of Pilocarpine and its Salts.

A powerful sudorific and sialogogue; after a time a large dose acts as an emetic, contracts the pupil of the eye, and causes approximation of vision.

The sweating and salivation from a full dose persist for 2 to 5 hours, the symptoms come on in about 10 minutes after taking the dose if external conditions are favourable. Hypodermically the alkaloid acts in 3 to 5 minutes. A reduction of temperature occurs. Jaborandi and pilocarpine have been used in a variety of diseases, most successfully in asthma, diabetes, dropsy and uræmia, and as antidotes to belladonna and opium poisoning. For hiccough small doses every 2 or 3 hours are of value. Children proportionately are not affected by the drugs so much as adults. Externally promotes growth of the hair, *e.g.*, in alopecia. In alopecia $\frac{1}{6}$ grain of the nitrate increased to $\frac{1}{3}$ grain injected into the scalp is recorded to have made hair grow.

Small doses ($\frac{1}{20}$ grain) check night sweating of phthisis and do not over-dry the skin.

Puerperal convulsions have been treated by injections.

Relieves nerve deafness, also itching of jaundice and assists passage of gallstones.

Pneumonia is treated by hypodermic injections of $\frac{1}{10}$ gr. and more or given *per os.*

In tinnitus aurium (acute labyrinthine) hypodermically is of value in suitable cases.

Bronchial asthma. An almost constant sensitiveness to Pilocarpine and Epinephrin is said to be common to all sufferers. Cases reacting to the latter were relieved by 0·25 Cc. of 1 in 1,000 solution. Small doses should be used. —B.M.J.E. i./21,85.

Pilocarpine which causes marked activity of most other glands has no effect on the secretion of the mammary gland.—K. Mackenzie, Jl. Exp. Physiology, Dec. 1911; see also Pituitary Extract.

Antidotes to Pilocarpine and Jaborandi preparations:—

After evacuating the stomach, give Tannin, then Atropine Sulphate or Tincture of Belladonna; *vide* also Poisons and Antidotes.

Strangury may be caused by Pilocarpine in too large a dose.

P1 Pilocarpinæ Hydrochloridum, P.G.VI., U.S., Fr. Cx., Ph.Ned.V. $C_{11}H_{16}O_2N_2HCl = 244·609$.

Dose.—$\frac{1}{20}$ to $\frac{1}{3}$ grain (0·003 to 0·02 Gm.) by mouth or hypodermically. In minute granular snow-white crystals, slightly deliquescent and very soluble in water. M.pt. between 195 and 199° C.

Uses.—*Vide antea.*

Ⓟ**Hypodermic Tablets** contain $\frac{1}{6}$ grain (0·01 Gm.).

P1 Pilocarpinæ Nitras. $C_{11}H_{16}O_2N_2.HNO_3 = 271·16$.

Dose.—$\frac{1}{20}$ to $\frac{1}{5}$ grain (0·003 to 0·012 Gm.). Fr. Cx. and Ph. Ned. V. *Max. single dose* $\frac{1}{3}$ grain approx. *pro die* $\frac{3}{4}$ grain.

In minute white granular snow-like crystals, but may be obtained in large white prismatic crystals. ***Soluble*** 1 in 8·2 of water, but very slightly in cold alcohol. This salt, preferred in England, was the first pure preparation of Pilocarpine prepared,—it was obtained by the late W. Martindale from an alcoholic solution.

The P1 **Phenate** and **Salicylate** have similar dose and properties.

Ⓟ**Tablets** of Pilocarpine Nitrate $\frac{1}{10}$ and $\frac{1}{5}$ grain to be given *per os.*

Ⓟ**Guttæ Pilocarpinæ Nitratis** 0·5 or 1%. R.O.H.

Used to contract the pupil of the eye. Ⓟ‘ **Sterules** ’ are prepared.

Ⓟ**Injectio Pilocarpinæ Nitratis Hypodermica R.O.H.**

Dose.—2 to 6 minims.

Pilocarpine Nitrate 1, Distilled water 20.

G.H. has the following. 'Remove the patient's night-shirt, wrap closely in a warm blanket, and cover with two more blankets. Put hot water bottles to his feet, and give hot drinks freely. After sweating has ceased, remove blankets gradually, dry the skin and leave him between warm dry blankets.'

Ⓟ**Hypodermic Tablets,** $\frac{1}{10}$, $\frac{1}{8}$, $\frac{1}{6}$, $\frac{1}{4}$, $\frac{1}{3}$, and $\frac{1}{2}$ grain (**0·006, 0·008, 0·01, 0·016, 0·02 and 0·03 Gm.**).

Ⓟ**Sterules, Hypodermic,** $\frac{1}{10}$, $\frac{1}{4}$, $\frac{1}{2}$ grain.

Ⓟ**Ophthalmic Discs,** $\frac{1}{500}$ grain, combined with gelatin.

Ⓟ**Lotio Pilocarpinæ,** for the hair.

Pilocarpine Nitrate 2 grains, Quinine Hydrochloride 8 grains, Glycerin 2 drachms, Rose Water 6 drachms. If *so ordered*, Cantharides Tincture 1 drachm may be usefully combined with above quantities.

Applied locally, and used internally or hypodermically, Pilocarpine seems to have an action in promoting the growth of hair in alopecia or dandruff. Used also in Ⓟ**Ointment,** 4 grains to the ounce of a mixture of wool fat and soft paraffin ointment.

Ⓟ **Granular Effervescent Pilocarpine Nitrate.**

Dose.—1 drachm containing $\frac{1}{10}$ grain for use in throat affections.

Ⓟ **Bromocarpin.** *Syn.* SYRUPUS PILOCARPINÆ ET POTASSII BROMIDI.

Dose.—For children 3 to 7 years of age 1 to 3 drachms daily; 7 to 15 years 1 to 6 drachms daily; adults $\frac{1}{2}$ to 1 ounce daily, *all spread over the day.* To be taken before meals.

Stated to have the composition Potassium Bromide 10, Pilocarpine Hydrobromide 0·005, Orange Syrup and Glycerin *q.s.* to 100, *by weight.* In epilepsy and nervous affections.

Ⓟ**Extractum Jaborandi Liquidum** (B.P. 1898). *Syn.* **Liquor Jaborandi.** 1=1 of leaves; in 45% Alcohol.

Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

Ⓟ**Tinctura Jaborandi** (B.P. 1898). 1 in 5 of 45% Alcohol.

Dose.—30 to 60 minims (**2 to 4 Cc.**).

Ⓟ**Linimentum Jaborandi.**

Jaborandi Tincture 1, Cantharides Tincture 1, Soap Liniment 4.
For hair falling off, to apply with friction.

PILULÆ.

As the excipient for pills intended to be varnished, use equal parts of powdered gum acacia and tragacanth with syrup *q.s.* Glycerin, if used at all is best mixed with alcohol. It is unsuited for hygroscopic drugs, such as soft extracts, squills, aloes, &c. For these mucilage of acacia or syrup is preferred, and tragacanth in moderation is useful as a 'hardener.' For insoluble metallic salts, glycerin of tragacanth (*q.v.*) may be employed, adding, if necessary, a small quantity of powdered acacia or althæa to give firmness.

For **Aloes** Pills Compound Decoction of Aloes is sometimes used.

For **Camphor** a little Tragacanth or Soap and Castor Oil; if with Quinine, Tragacanth and Glucose Syrup, *q.s.*

Unguentum Kaolini (*q.v.*) works satisfactorily for oxidising agents such as **potassium permanganate.** For **Oils** soap is best used.

In the *B.P.* '14 Pill masses **Syrup of Glucose** is employed; this is prepared by heating Glucose 1, with Syrup 2, *v. also* **Glucantha.**

Codeine and other Pills given in diabetes should not be massed with Syrup of Glucose.

Pill Varnish (*Martindale*). Sandarach 1, in Absolute Alcohol 1. Sandarach is a resin from *Callitris quadrivalvis* (*Coniferæ*). *Alcohol Sandarachi*, R.D.H. For dental use. Sandarach 2, Alcohol (90%) 1.

In **Coating** Pills with **Gelatin** the pills are held on needles or by suction in a frame and dipped in a solution of 1 part of gelatin in 4 parts of water.

In **Pearl-Coating**, the Pills are first covered with a mucilage of tragacanth 4 grains to 1 ounce with half a drachm of syrup added; they are then coated by rotating in a pot with French chalk.

The **Sugar-coating** of Pills is effected by placing them in a hemispherical metallic pan kept warm, while making eccentric revolutions, and are alternately moistened with syrup, and dusted with finely-powdered sugar, till dry and uniformly covered.

Methods of Coating Tablets, Pills, Capsules, &c., to render them insoluble in the Gastric Juice but soluble in the Intestines.

Various substances have been suggested for coating pills, tablets and capsules to render them insoluble in the stomach but soluble in the intestines, *i.e.*, on reaching the duodenum. Drugs, for example, which irritate the mucous membrane and the administration of which is liable to induce vomiting, and substances intended to act solely on the intestines and the anthelmintic drugs, have been so given. The recent important requirements relative to **Iodo-Ray**, *q.v.*, should also be mentioned. *Keratin*, as usually employed, seldom brings about the desired effect.

Keratin* is an ammoniacal solution of horn shavings in the form of a syrup Sp. Gr. about 1·02. In using Keratin the pills must not contain moisture or vegetable powders. As a pill basis employ Kaolin with Suet, coat 3 to 5 times with the Solution and finally roll in non-absorbent powder. A coating of wax prior to the Keratin coating is sometimes employed.

Benzonaphthol Varnish.—Benzonaphthol 6, Tannigen 10, Salol 20, Alcohol 90% 30, Ether 100, has also been recommended, but we obtained no better result with it.

Salol applied *melted* is more efficacious. 1½ to 3 grains of Salol applied in this way is suitable for a 3 to 5 grain pill. *cf.* Bismuth Compound Pills, p. 235.

✱ **Stearettes** (T.M. 322854) (*Martindale*) are made with a coating containing **Stearic Acid** *inter alia.* Stearic Acid alone is useless,—it cracks on drying.

Aceto-Salicylic Acid 2 to 5 grains.
Aloes 2 to 4 grains.
Antipyrin 1 to 5 grains.
Areca 2 to 5 grains.
Calcium Sulphide ½ and 1 grain.
Carbolic Acid ½ to 1 grain.
Emetine-Bismuth Iodide 1, 2 and 3 grains.
Iodo-Ray 0·3 and 0·5 Gm.
Ipecacuanha ¼ to 2 grains.
Magnesium Peroxide 3 grains.
Menthol ½ to 1 grain.
Methylene Blue ½ to 1 grain.
Naphthol Bismuth 2 to 5 grains.
Ox Bile 5 grains.
Pancreatin 1 to 2 grains.
Phenol Bismuth 2 to 5 grains.
Potassium Iodide 5 grains.
Quinine Aceto-Salicylate ½ to 2 grains.
Quinine Salicylate ½ to 2 grains.
Quinine Sulphate ½ to 3 grains.
Reduced Iron 1 to 3 grains.
Sodium Salicylate 2 to 5 grains.
Thymol ½ to 1 grain.
Trilactine.

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*✱ **Humagsolan** (T.M. 406645/429166) Tablets. This preparation is based on the supposition that, given an increased supply to the hair papillæ of the proximate organic material out of which is manufactured keratin—the organic basis of certain epidermic appendages—it might be possible to influence favourably the growth of wool and hair.—L. ii./20,1285.

Trial on a long-standing case of alopecia seemed to substantiate claims.—L.i./23,658.

Stearettes should as a general rule be given immediately after a meal—*i.e.*, when the stomach is *acid*.

Pills.—The 'Stearette' coating is also applicable to pills but with greater difficulty. Tablets are easier to operate upon.

Formagules (Formalised Gelatin Capsules).

Where the digestive functions are normal, these should pass the stomach intact and break up in the intestines.

The following **Formagules** are suggested :—

Aloes 2 to 4 grains.
Asafœtida 5 grains.
Copaiba 5 to 10 minims.
Creosote ½ to 2 minims.
Eucalyptol ½ to 1 minim.
Guaiacol Carbonate 1 to 4 grains.
Ichthyol 1 to 5 grains.
Iodinol 10 minims.
Male Fern Extract 10 minims.
Methyl Salicylate ½ to 1 minim.
Ox Bile 5 to 10 minims.
Quassia Extract 2 grains.
Salol 2 to 10 grains.
Santal Oil 5 to 10 minims and Compounds.
Santalol 5 minims.

Formagules should be employed for substances which irritate gastric mucous membrane, neutralise acidity of stomach, or are to act on intestinal membrane but not in the stomach, *e.g.*, to destroy worms.

They should be quite recently made. The hardening effect of formalising continues on keeping.

Sahli's Glutoid Capsules are made on these lines. *Vide* also **Membroids.**

A revised list of pills in general request is contained in the Index.

✱**Pulverette** (T.M. 293309) **Powder Pills (Patent)** are of special manufacture. These have a thin coating easily crushed.

Cachets of wafer paper are useful for enclosing nauseous medicines and drugs that do not yield all their activity to any solvent, and those whose suspension in fluids is difficult or inaccurate owing to non-diffusibility or decomposition.

Capsules, Soft Gelatin, are used for nauseating drugs, *e.g.*, oils, *vide* Index.

✱**Slipules** (T.M. 419586). This Registered Trade Mark, the property of the author, is applied to the hard gelatin capsule of commerce of the 'slipover' variety, the *number* of the slipule for a dose of the medicament is frequently shown in our pages :—

			Content in Sodium Bicarbonate.
No. 5 Slipule (closed) has length	11 mm. and diam.	4 mm.	3 grains.
,, 4 ,, ,, ,, ,,	15 ,, ,, ,,	5 ,,	4 ,,
,, 3 ,, ,, ,, ,,	17 ,, ,, ,,	5 ,,	5 ,,
,, 2 ,, ,, ,, ,,	18 ,, ,, ,,	6 ,,	6 ,,
,, 1 ,, ,, ,, ,,	20 ,, ,, ,,	6 ,,	8 ,,
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,, 000 ,, ,, ,, ,,	26 ,, ,, ,,	10 ,,	25 ,,

The word is a convenience to differentiate from the soft variety of Gelatin Capsule and makes for uniformity in dispensing.

The author takes the pleasure of presenting the name Slipule to medical men and pharmacists *for the purposes of prescribing and dispensing.* In all other respects its use is reserved by the owner. All Trade Marks (indicated by ✱) in other portions of the book must be strictly observed.

PINUS.

Pinus Sylvestris. *Syn.* SCOTCH FIR OR PINE.

From the wood of this tree (principally in America, France and Russia) much of the oleo-resin, common turpentine, oil of turpentine, Gum Thus or American frankincense, resin or colophony and tar (*vide* Pix Liquida) are produced. From its leaves also are prepared an extract, volatile oil and wool.

By 'Turpentine,' *i.e.*, **Terebinthina N.F.** and **P. Svec. X.** and in other countries is meant the concrete oleo-resin obtained as exudates from various species of Pinus. Synonyms for this natural product are Gum Thus, Thus Americanum and Common Frankincense as mentioned. **Bordeaux Turpentine** is a variety obtained in S. W. France. **True Frankincense** is generally understood to be **Olibanum** from *Boswellia Carterii* and other species.

Oleum Terebinthinæ (Rectificatum) *B.P.* '14. (*Syn.* CAMPHINE), is distilled from the Oleo-Resin Turpentine obtained from *Pinus Sylvestris* and other species of *Pinus*. Sp. Gr. 0·860 to 0·870. Almost entirely distils between 156° and 180° C. without appreciable residue. O.R. varies from different countries.

Collection of Turpentine in the Landes Department of France, from Bordeaux to Biarritz.—P.J., ii./27,245.

Oleum Terebinthinæ Æthereum, FR. CX., is distilled from *P. Pinaster* in France. Sp. Gr. 0·864 at 15° C.

See Vol. II. for further data.

Capsules of Oil of Turpentine, 5 and 10 minims each. *Dose.*—1 or more.

Uses.—In INTERNAL HÆMORRHAGE 10 minim doses often successful. In enteric has been given as capsule or emulsion with Spirit of Chloroform—10 minims every two or three hours. Anthelmintic (3 to 4 drachms or more) generally given with Castor Oil. Also given to remove fæcal masses (with Castor Oil) and to remove bile concretions.

Large dose, 2 drachms to ½ ounce and more said to be non-irritant, as also 5 to 10 minim doses, but moderate doses 30 to 60 minims to be used with caution. Large doses act on bowel only, and are little absorbed into the circulation. Hæmostatic in hæmorrhagia purpura. For children of 10 to 12 as much as ½ ounce given with equal quantity of Castor Oil.—B.M.J. i./09,1218.

Obstinate inflammatory or semi-inflammatory conditions of the eye have been treated.—B.M.J. i./11,82.

HÆMOSTATIC ACTION of Turpentine when brought into immediate contact with the surface. Arrested hæmorrhage in a "bleeder" under operation. Use as a compress by soaking lint in it and squeezing nearly dry. Support by a pad of wood wool and fix with a firm bandage. Also successful in secondary hæmorrhage in war wounds. Value when taken by the mouth doubtful.—G. G. Turner, L. ii./15,226. See also *ibid.*, p. 416. Gauze lightly wrung out in it used to pack sloughing wounds, the change is remarkable. Avoid excess and none of the oil should lie outside the wound or the skin will blister.—C. A. Moore, B.M.J. ii./16,744.

An old-fashioned styptic valuable in packing a tonsil bed.—R. S. Stevenson, L. ii./25,1332.

URETHRITIS.—In cases of a chronic kind, urethral chancroid and specific urethritis, local applications of Turpentine to the urethra by means of a catheter have given very satisfactory results.—L. i./11,982.

In ENTERIC FEVER a preliminary thorough cleansing of the bowel by small divided doses of Calomel followed by Castor Oil prepares the ground for an enema of 1 ounce with Olive Oil 1 pint given slowly. Next day or day after repeated. In most instances the amount of Turpentine may then be reduced to ½ ounce in Olive Oil 15 ounces, this is administered on alternate days throughout the whole course of the disease and continued until convalescence is established.—B.M.J. i./10,195.

For TAPE WORM 1 ounce doses with castor oil. No injurious effect on the kidneys.

'Turpentine Punch.' Ten drops of turpentine on a lump of sugar added to a wine-glass of ordinary whisky punch for septic pneumonia.—Sir J. Moore, Pr., Jan. '19, per Pres.

Sterules of Rectified Turpentine 15% in Olive Oil, 1 and 2 Cc. for intramuscular use.

Skin affections treated by Turpentine injections. *Dose*—0·5 to 1 Cc. every 4 to 7 days for adults, 1 to 2 minims weekly for infants up to 5, and 4 minims for older children. Used in skin affections caused by an infective agent or in which, as in pityriasis rosea or pemphigus, some form of micro-organism may be the causative factor. A 15% solution in Olive Oil with 0·5% each of Anæsthesin and Quinine Hydrochloride is used. In some cases no benefit, *e.g.*, in erythema, urticaria or purpura. The best results were obtained in pyogenic conditions of the skin, associated with poor general tone, *e.g.*, in ecthyma, furunculosis, sycosis vulgaris, lupoid sycosis, abscesses and erysipelas. In severe cases of varicose ulcer the lesions became cleaner and rapid formation of granulations and epidermal tissue followed. The general effect is thought to be increased local cell metabolism.—L. ii./22,1287.

Turpentine Injections (10% to 20% in Olive Oil) at Mount Sinai Hospital. The site selected was the intersection of an horizontal line drawn from the posterior axillary border and a line one or two finger's breadth below the brim of the pelvis. At this part the needle easily strikes the periosteum, upon which the injection is made. Good in some cases of acne, especially good in ulcer of the leg.—Med. Rec., Jan. 14,1922; Pr., Aug. 22/188.

Intramuscular injections of 0·5 to 1 Cc. of the 15% solution gave good results in many skin diseases, especially in pyogenic infections where there is follicular involvement, in which cases use 'X' Rays as well.—Jl. Trop. Med., June 1/23, 197.

Chilblains of the legs treated with Turpentine injections.—B.M.J., i/25,1194.

Artificial abscess formation in non-specific immunisation.—*See also* ***Peptone*** p. 675.

Emulsum Olei Terebinthinæ, U.S X.

Average dose.—½ drachm (2 Cc.).

Emulsify Turpentine Oil 15, Acacia 5, with water 10, then add water to 100.

Another form:—Turpentine Oil and Quillaia Tincture, of each 20 minims, water to 1 ounce.

Enema Olei Terebinthinæ, St. M.'s H.

Turpentine Oil ½ ounce, Starch Mucilage to 10 ounces. L.H. has Turpentine ½ to 4 drachms, Enema Simplex to 1 pint. The Oil is mixed with ½ of the Simple Enema. This is given and followed by the other half of Simple Enema. Enema Simplex is Soft Soap 1 ounce, Warm Water to 1 pint.

For flatulent distension of the colon of great value. On diagnosis of appendicitis if considerable flatus, an enema of Turpentine Oil is of value. Some give a dose of Calomel, but the peristalsis set up may be harmful.

Stokes' Liniment, N F. *Syn.* LINIMENTUM ALBUM.

Mix one entire egg with Rose Water 85 Cc. Strain and add Turpentine Oil 100 Cc., then Acetic Acid 20 Cc. Shake thoroughly to emulsify and finally add Lemon Oil 4 Cc.

Linimentum Terebinthinæ (*B.P.* '14).

Contains Turpentine Oil 65%.

Knight's method is satisfactory.—Mix Solution of Potash (B.P. '98) 3 ounces with water 3 ounces in a bottle, add Oleic Acid 7 drachms previously mixed with Oil of Turpentine 3 ounces, and mix gently. To this emulsion add Turpentine 10 ounces with Camphor 1 ounce dissolved in it, in portions of 1 ounce or more at a time.

Linimentum Terebinthinæ Aceticum. *Syn.* **St. John Long's Liniment.** Emulsify Turpentine 3 ounces, Rose Water 2½ ounces, Acetic Acid 5 drachms, Oil of Lemons 1 drachm with yolk of one egg. A useful counter-irritant. *Distinguish from* Lin. Tereb. Acet. *B.P.* '14.

Gossypium cum Oleo Terebinthinæ. *Syn.* **Turpentine Wool R.D.H.** Cotton wool or gauze soaked in the oil and squeezed dry, packed into the tooth socket as a stupe.

Spiritus 'Antiparalyticus.'—Turpentine Oil 4, Oil of Amber 4, Camphorated Spirit 64, Solution of Ammonia 28. Used as a liniment.

Sapo Olei Terebinthinæ.

Turpentine 1, Soft Soap 2, Glycerin 1. As a vermicide—also a stimulant local application.

✱ **"Sanitas" Fluid,** (T.M. 64575), the solution resulting from the action of water upon air-oxidised turpentine, containing as its active principles hydrogen peroxide, thymol, a soluble camphor, and some camphoric acid. A household disinfectant and oxidiser. Non-poisonous, does not stain linen. Is used in midwifery. **"Sanitas" Oil** has Sp. Gr. 0·95. A strong oxidising agent. For inhalation in phthisis. Diluted with spirit used as spray in a room, or 1 in 8 to 20 of olive oil for skin affections.

(Other T.M.s are 33175, 34778, 48108 and 444095.)

✱ **"Sanitas Bactox"** (T.M. 279528). A disinfectant of the coal tar order for medical use.

Extractum Pini Sylvestris. **Fir-Wool Extract.**

A thick brown liquid, soluble in water and with pine odour; 2 to 4 ounces are added to a 30-gallon warm bath for rheumatism.

Oleum Pini, **Oil of Pine.** *Dose.*—$\frac{1}{2}$ to 3 minims (0·03 to 2 Cc.).

The oil of the leaf of *Pinus Pumilio* (*Coniferæ*) was official in the B.P. 1898 and is in U.S.X. It is used for inhalations.

In a pure oil not more than 1% distils below 165° C.—Finnemore.

The oil distilled from the fresh leaves of *Pinus siberica* is *B.P.*'14, as **Oleum Abietis.** Sp. Gr. 0·900 to 0·920. It should contain 30 to 40% of esters (calculated as bornyl acetate, $C_{10}H_{17}.C_2H_3O_2$), as determined by saponification with alcoholic potash. The aroma of this oil is entirely distinct from that of *P. pumilio* and *P. Sylvestris.*

MOSQUITO LARVÆ AND PUPÆ.—Pine Oil has a powerful or soporific or paralysing effect on, resulting in their death. A mixture of crude oil and Pine Oil, in the proportion of nine parts of the former to one of the latter, is effective in destroying all stages of Anopheline and Culicine larvæ and pupæ.—Am. Jl. Hyg., per Jl. A.M.A., ii./25,221.

Syrupus Pini Pumilionis—*Martindale.*

Dose.—1 drachm (4 Cc.).

Contains Pine Oil 1 in 60 in a dilute Glycerin and Syrup Solution.

Ⓟ**Linctus Pini, Terpin et Heroin.**—*Syn.* ELIXIR OR SYRUP OF PINE, TERPINE AND HEROIN.—*Martindale.*

Dose.—1 drachm (4 Cc.). Resembles the foregoing with addition of $\frac{1}{48}$ grain Heroin Hydrochloride and $\frac{1}{4}$ grain of Terpine Hydrate per drachm. Both are useful soothing antispasmodic preparations.

Elixir Pini et Terpin Hydratis (Simplex).

Dose.—1 drachm (4 Cc.) diluted.

Similar to the last mentioned, but without Heroin and containing a minimum of Alcohol, for children's use.

Ⓟ **Pinheroin.**

Dose.—1 drachm every 2 or 3 hours, if necessary.

Contains Heroin Hydrochloride $\frac{1}{40}$ grain, Terpine Hydrate 1 grain with Essence of Canadian Pine. A special preparation as a respiratory stimulant.

Ⓟ**Glycogelatin Pastils** (*q.v.*) are prepared containing each $\frac{1}{2}$ minim of Pumilio Pine Oil with $\frac{1}{8}$ Terpene Hydrate, and $\frac{1}{48}$ grain Heroin Hydrochloride.

Artificial Venice Turpentine.—Mix Resin 17, Linseed Oil (boiled) 12, Oil of Turpentine 8, or dissolve Resin in Oil of Turpentine: is mostly employed in the Arts. The true article exudes from the branches of the larch, *Larix Europæa* (*Coniferæ*). Common turpentine and artificial products consisting of colophony, resin oil and oil of turpentine, are often employed.

Larch bark is an astringent (owing to Tannin content) and diuretic.

Alcoolat de Fioraventi. *Syn.* BALSAMUM FIORAVENTI, FR. CX. Venice Turpentine (Térébenthine de Mélèze) 10, Elemi 2, Storax 2, Galbanum 2, Myrrh 2, Laurel Berries (Baies de Laurier) 2, Aloes 1, Galangal 1, Ginger 1, Zedoary 1, Ceylon Cinnamon (Canelle de Ceylan) 1, Cloves (Girofles) 1, Raisins (Muscades) 1, Origanum Dictamnus flowers (Dictame de Crète) 1, Alcohol (80%) 60. Macerate 2 days *s.a.* and distil to obtain 50. It is used as an embrocation in rheumatism.

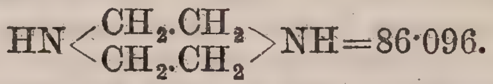
For alopecia, Liquor Ammoniæ 1, Baume Fioraventi 15, Spirit of Camphor 15. Apply with friction after washing with soap.

Balsamum Locatelli.—Venice Turpentine 18, Yellow Wax 12, Olive Oil 18 Balsam Peru 2, Dragon's Blood 1. For chilblains (even if broken).—Ph. Notes.

Dutch Drops, Haarlem Drops.—For lumbago and rheumatism.

Ph. Form says:—Form now generally adopted in Denmark and Holland is:—Heat to 165° C in an iron vessel, large enough to allow some frothing Linseed Oil 4 and Sulphur 1, with stirring, until mixture drops off the stirrer with a glassy appearance. Remove from the fire and add 15 parts (by weight) of Oil of Turpentine, and agitate until solution is complete or nearly so, then filter. The liquid should be limpid and of a brownish-red colour.

PIPERAZIN. FR. CX.

DIETHYLENE-DIAMINE. 

$$HN{<}\begin{matrix}CH_2.CH_2\\CH_2.CH_2\end{matrix}{>}NH=86{\cdot}096.$$

(PIPERAZINE HYDRATE with $6H_2O$ is in addition official in FR. CX. Supp. 1920. It contains 44·33% Anhydrous Piperazin).

T.M.: The word Piperazine by itself is not registered. A firm registered 166600/1892, a device embodying the word but disclaiming exclusive use of the word. PATENTS: All expired.

Dose.—4 to 10 grains (0·25 to 0·6 Gm.), or 15 grains daily.

Manufactured by the action of sodium glycol on ethylene-diamine hydrochloride; colourless alkaline deliquescent crystals of saline taste, soluble about 4 in 7 of water. Melts at 104° to 107° C., B. pt. 145° C.

The following process has been given:—

A mixture of Ethylene Bromide, Aniline and Anhydrous Sodium Carbonate is heated to gentle boiling for 5 to 6 hours, the warm fused mass extracted with hot water and the crude Diphenyl Piperazine transformed into the Nitroso-derivative by suspending it in cold strong Hydrochloric Acid and gradually adding saturated solution of Sodium Nitrite through a tube reaching to the bottom of the acid. Add the precipitate to a 40% solution of Sodium Acid Sulphite and warm to about 80° C. Make strongly alkaline with Caustic Soda and concentrate by distillation. Distil the residue with superheated steam and collect in Hydrochloric Acid.—Pratt & Young, Jl. Am. Chem. Soc., 1918, 40, 1428, Y.B.P. 1919, 152.

Flavoring.—Glyl Sassafras, Glyl Caryophylli; Syrupus Aurantii.

Uses.—Given internally for the uric acid diathesis, in gout and rheumatism, and urinary calculi. Said to prevent change from glycogen into sugar in diabetes.

It used to be taught that owing to impaired power of excreting Uric Acid by the kidneys, the observed accummulation occurs in the blood and that in consequence Sodium Biurate was deposited in tissues, *e.g.*, cartilages, giving the exciting cause of a paroxysm of gout. Of recent years the opinion has steadily tended back to closely resemble the original, but it is unfortunately *useless to administer a base and expect it to reach any spot in the body in sufficient quantity to have a chance against the Sodium which is so abundant in the blood and tissues.*—Sir A. E. Garrod.

Incompatible with alkaloidal salts, iron salts, quinine, sodium salicylate, spirit of nitrous ether.

Effervescent Piperazin contains 5 grains in a drachm. *Dose.*—1 drachm (**4 Gm.**). Also made with **Phenocoll.** 5 grains per drachm. **Tablets** and **'Vescettes' of Piperazin,** 5 grains (**0·3 Gm.**) to be crushed and taken in a draught of warm water.

Glycero-Piperaz.—*Syn.* PIPERAZIN GLYCEROPHOSPHATE, BASIC. $(C_4H_{10}N_2)_2C_3H_5(OH)_2PO_4H_2 = 344{\cdot}291$.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**).

A granular white salt very soluble in water, neutral to Litmus and containing 50% Piperazin. Our work has shown that this salt is the most easy of the kind to prepare and the most stable. It does not deliquesce as do the neutral and acid salts.

Benzo-Piperaz. PIPERAZIN BENZOATE—$C_4H_{10}N_2(C_7H_6O_2)_2 = 330{\cdot}192$ and **Salicyl-Piperaz.** PIPERAZIN SALICYLATE—*Dose* 2 to 5 grains —$C_4H_{10}N_2(C_7H_6O_3)_2 = 362{\cdot}192$ are crystalline salts also suggested for therapeutic use.

Piperazine compounds of substituted Phenyl-arsinic Acids subject of patent 252,099.

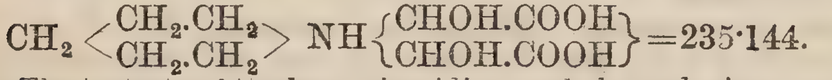
Sidonal, New. *Dose.*—30 grains (**2·0 Gm.**).

TRADE MARK 229305/1900 was removed from the Register in 1914.

Said to be the anhydride of Quinic Acid. White crystalline powder, soluble about 1 in 2 of water, and about 1 in 11 of alcohol 90%. For gout. **Tablets** contain 7½ grains.

The original Sidonal was Piperazin Quinate. Details of the Patent (No. 11420/1899, which became void), in Edn. XVII., p. 650.

Piperidinæ Tartras. *Syn.* PIPERIDINE ACID TARTRATE.



$$CH_2 \left< \begin{matrix} CH_2.CH_2 \\ CH_2.CH_2 \end{matrix} \right> NH \left\{ \begin{matrix} CHOH.COOH \\ CHOH.COOH \end{matrix} \right\} = 235{\cdot}144.$$

The tartrate of the base piperidine made by reducing pyridine in alcoholic solution, with sodium amalgam or from Piperine by distillation with Soda Lime or by boiling with Alcoholic Potash.

Dose.—15 grains (**1 Gm.**) three times a day. Colourless pleasant-tasting crystals, readily soluble in water. Uric acid solvent.

Effervescent Piperidine Tartrate.

Dose.—1 drachm or more; 5 grains in 1 drachm.

PIX LIQUIDA.

Syn. PIX PINI, U.S.X.

Tar (*B.P.* '14). Known in commerce as Stockholm Tar, obtained by the distillation of the wood of various species of *Pinus* (*Coniferæ*). *Further details in Vol. II.*

Dose.—2 to 10 grains (**0·12 to 0·6 Gm.**) in a pill with lycopodium, or in perles (2½ grains each).

As a diuretic and in bronchial catarrh and for coughs, it is very useful, and has been given for gastro-intestinal catarrh. ***Soluble*** about 1 in 1 of alcohol 90%. On account of their antiseptic properties both Wood and Coal Tar and preparations of them have been used for surgical dressings. The former yields Creosote, *q.v.*

Aqua Picis. **Tar Water.**—*Syn.* AQUA PICEA, EAU DE GOUDRON. Tar 1, Sand 3. Mix and add distilled Water 200. Macerate with shaking for 24 hours, filter. *Dose.*—5 to 10 ounces (**150 to 300 Cc.**).

Pix Burgundica. *Burgundy Pitch* (a misnomer as it comes from Normandy) the exudate from *Picea excelsa* (*Coniferæ*), was employed in making **Emplastrum Picis** (B.P. 1898).

Oleum Picis Rectificatum, Light Oil of Tar. U.S. X.

Dose.—1 to 5 minims (0·06 to 0·3 Cc.).

A distilled oil of Pine Tar, known also as Rectified Spirit of Tar with Sp. Gr. about 0·9, sherry-coloured or reddish: antiseptic.

Pilula Picis Liquidæ.

Dose.—1 to 5 grains (0·06 to 0·3 Gm).

Tar 1, Soap 1, Compound Tragacanth Powder $\frac{1}{4}$, Licorice Powder $2\frac{3}{4}$. Useful for coughs and for hæmorrhoids—best freshly made.

Syrupus Picis Pini, Syrup of Tar, U.S. X.

South American *Syn.* JARABE BREA.

Dose.—$2\frac{1}{2}$ drachms (10 Cc.).

Mix Rectified Oil of Tar 1, with Water 450 and shake 15 minutes. Set aside 24 hours, filter and dissolve Sugar 850 in the filtrate and make up to 1,000. Ⓟ $\frac{1}{33}$ to $\frac{1}{16}$ grain of apomorphine hydrochloride may also be added to each dose. Useful in chronic bronchitis and winter cough.

Ⓟ**Syrupus Picis cum Codeina. P. Helv.**

Codeine 1, Sugar 505, Tar Water 324, Glycerin 150, Dilute Alcohol 20. *Dose.*—$\frac{1}{2}$ to 2 drachms (2 to 8 Cc.).

Unguentum Picis Liquidæ. Tar Ointment (*B.P.* '14).

Contains 70% of Tar in a basis of Beeswax and Lard. U.S.X. has Pine Tar 50, Yellow Wax 15, Petrolatum 35. Useful in psoriasis and chronic dry eczema.

Unguentum Picis Compositum. Ringworm Ointment, Ph. Ned. V.

Heat together Water 20, Tar 16, Resin 4, and add with stirring Starch 16 mixed with Water 30, then Venice Turpentine 4, Acetic Acid 30% 8, and Water to 100.

Oleum Cadinum. U.S., P. Helv. Fr. Cx. Supp. 1920.—*Syn.* **Juniper Tar Oil. Oleum Juniperi Pyro-ligneum. Huile de Cade.**

By distillation of wood of *Juniperus Oxycedrus* (*B.P.* '14) and some other species (*Coniferæ* or *Pinaceæ*). This oil varies enormously.

For Characters, Tests, and Results of some Experiments see Vol. II.

In most cases of psoriasis a seborrhœa of the scalp will be found. This is well treated with Soap and Water followed by a Salicylic Lotion, Oil of Cade 1 in 5 of Olive Oil and gradually increasing strength till the pure Oil is used.

A good deal is distilled in Spain. Extreme limits of Sp. Gr. observed during twenty years—0·955 to 1·064. Methods of making. Contains, if genuine, (from J. Oxycedrus) high proportion of Cadinene and does not give reaction for pine tar.—C. T. Bennett, P.J. ii./21,166.

Oleum Cadini Aceticum.

Acetic Acid 1, Cade Oil 10. This and the former are used for alopecia. The following are used in psoriasis and dry eczema.

Unguentum Olei Cadini et Sulphuris.

Cade Oil 10, Sulphur 1, Vaselin 15, Lanolin 15.

Unguentum Olei Cadini.

Melt Yellow Beeswax 1, add Huile de Cade 1, and stir till cold Lard may be used as a diluent if a weak ointment be required.

Unguentum Betulæ Compositum, St. G. H. Huile de Cade 1 drachm, Resorcin 10 grains, Ichthyol 10 grains, Oil of Sweet Birch 10 minims, Lard to 1 ounce.

Oleum Fagi Pyroligneum, **Beech Tar.**

On the Continent used as a source of creosote.

Linimentum Picis (Lassar).

Beech Tar 4, Birch Tar 3, Olive Oil 1, Alcohol (70%) 1.

Oleum Rusci Pyroligneum. Said to be obtained from **Butcher's Broom.** Is really identical with *Oleum Betulæ Pyroligneum,* **Birch Tar.** A yellowish-brown oil from *Betula Alba* (L.).

The above Oils are used instead of Tar in skin affections. The odour of russia leather is due to Birch Tar. They are all miscible with fats, but do not blend perfectly with alcohol.

Huile de Bouleau is obtained by distillation of *Betula Alba.*

No reason why Birch Tar should not be distilled in England or Scotland.—E. M. Holmes, P.J. i./21,508.

Unguentum Rusci Compositum. Birch Tar 30, Calamine 45, Resin Ointment 120, Zinc Ointment 120, Carmine Trituration 4, Liquid Paraffin 15. For chilblains, eczema, prurigo and psoriasis, and for irritation due to piles.

Ung. Sedresol (Ferris).

A combination of Beech-tar, Zinc Oxide and antiseptics. Sedative, antiseptic and healing in eczema, psoriasis, erysipelas, shingles, erythema, seborrhœa, dermatitis, pruritus ani and vulvæ, in inflammations and eruptions of the skin, and in burns and scalds.

PLUMBUM.

$Pb = 207{\cdot}2.$

Plumbi Acetas. *Syn.* Sugar of Lead, **Saccharum Saturni.** $Pb.(CH_3COO)_2.3H_2O = 379{\cdot}286.$

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

Colourless crystals or masses soluble in water 1 in less than 3; in Alcohol (90%) 1 in 30, in Glycerin 1 in 2.

Incompatible with Carbonates, Soluble Chlorides, Sulphates, Tannates, Potassium Iodide and Opium preparations. The *Subacetate* is incompatible with Acacia Mucilage.

Uses.—Astringent, *e.g.*, in severe diarrhœa, and as a hæmostatic (of doubtful value) in gastric ulcer; it is a powerful poison. Externally for eczema, leucorrhœa, gleet, pruritus and for bruises.

Inoperable cancer treated by Lead Acetate sometimes with improvement. 1½ grains daily for first week, then twice a day until patient becomes pasty yellow. Growths of the uterus do not seem to respond.—G. C. Belcher, B.M.J., ii./25,1040.

Antidotes.—Emetics or Stomach Tube, Magnesium or Sodium Sulphate followed by stimulants.

Atropine in full doses relieves colic and keeps bowels open.

Plumbic optical neuritis due to poisoning with lead paint treated with Dilute Sulphuric Acid and Saline laxatives, hypodermic injections of Pilocarpine (the latter continued for six weeks), after the first few days Potassium Iodide, 5 grains thrice daily for a child of 8 years.

Potassium Iodide must be used with caution—sudden death may occur due to the entrance of a large amount of soluble lead salt.

Ocker's treatment with Sodium Hyposulphite (0·6 Gm.) in industrial poisoning in the States, also the intravenous injection of Calcium Chloride, 15 Cc. of 5% solution relieves colic.—B.M.J., ii./26,344.

Care must be taken to distinguish a Lead line from a Mercurial gum line as in lead workers.—L. ii./12,1138,1166. *cf.*, Hydrargyrum, p. 467.

Lead poisoning from face enamel, which on analysis showed a very high lead content.—H. W. Woltman, per Clin. Jl., Jan. 24/23,48.

Abortifacient Use.—Morphine and a course of Mist. Alba successful. Blue Lead lines on gums disappeared. Children born in each case. In one the woman admitted taking 60 grains of Lead Acetate in a fortnight.—R. Craik, B.M.J., ii./26,908.

For some details of Lead Poisoning in the Potteries, etc., see Vol. II.

Glycerinum Plumbi Subacetatis (*B.P.* '14).

This is similar to **Goulard's Extract—Liquor Plumbi Subacetatis Fortis** (*B.P.* '14), with glycerin for the solvent in place of water.

Liquor Plumbi Subacetatis Dilutus (*B.P.* '14), is 1 of the Concentrated Liquor with water *q.s.* to 80.

In chronic eczema the Glycerin of Subacetate of Lead is useful. It should first be applied diluted 1 part with about 7 of glycerin, or *better* 1 *with* 7 *of water*, and the strength gradually increased; it desiccates the eruption without producing a hard crust. Some uterine affections are well treated with the diluted glycerole. For inflamed joints after injury to bruised surfaces, lead lotion (warmed) is useful. It should be used with caution to the eyes if the cornea is damaged. In gonorrhœa compresses are used prior to injections.

Liquor (or **Lotio**) **Plumbi Lactatis** is 1 part of Solution of Lead Subacetate to 9 of Milk. A little Eau de Cologne may be added. For nettle rash and any skin irritation.

Burns may be treated with Lotio Plumbi, some state, without danger from absorption.

Incompatibility with Phenol. See p. 14.

Unguentum Plumbi Subacetatis (*B.P.* '14).

Strong Solution of Lead Acetate 1 in 8 in a compound basis.

Jelly-fish stings. Apply the following ointment. Lanolin 1, Paraffin Ointment 3, Almond Oil 4, Lime Water 8, Strong Solution of Lead Subacetate 4, Clove Oil $\frac{1}{12}$. Said to be superior to Carron Oil for this purpose.—Brooke.

Injectio Plumbi L.H. (*Vaginal*).

Strong Solution of Lead Acetate 60 minims, Water to 1 pint.

Lotio Plumbi Talci et Amyli. (Formula of Boeck). Dilute Lead Subacetate Solution, Talcum, Starch, and Boric Acid Solution (1%) of each 10 by weight, Glycerin 4, Camphor Water 25. Relieves itching.

Linimentum Boeckii, P. Svec. X.

Dilute Lead Subacetate Solution 56, Talcum 18, Starch 18, Glycerin 8.

Ⓟ **Lotio Plumbi et Opii.**

Tincture of Opium 1 to 159 of Dilute Lead Acetate Solution (1 drachm to 1 pint).

𝔅 𝔓 1 **Solubes Plumbi et Opii** represent:—

Lead Acetate 2 grains, Opium Tincture 20 minims. For dilution with warm water 5 ounces, more or less according to the purpose required. Although used to a certain extent in this form, Opium is said to be entirely devoid of peripheral anæsthetic effects and Lead likewise, because the precipitation of proteins is prevented by the intervention of the epithelium.

Lotio Plumbi Spirituosa. Lead Subacetate Solution 1, Glycerin 2, Alcohol (90%) 4, Rose Water to 32. Relieves piles promptly.

Lotio Plumbi Evaporans, R.O.H.—Diluted Solution of Lead Acetate 4, Alcohol 90% 4, Water to 100.

Plumbi Nitras, $Pb(NO_3)_2$ = 331·216. Colourless or opaque crystals. Soluble in water about 1 in 2.

Ingrowing toenail treated with Lead Nitrate as dusting powder. Remove scab that forms next day. Apply a little strong Phenol first,—this prevents pus which may form.—B.M.J. ii./13,746,939.

Plumbi Carbonas. CERUSSA, Ph. Ned. $2PbCO_3,Pb(OH)_2$=775·616.

Heavy white insoluble powder, soluble in dilute Acetic and Nitric Acids. Used as dusting powder for burns. 1 to 10% ointment in skin diseases.

Pasta Plumbi cum Cupro.—(A) Lead Carbonate 8 ounces, Mastich Varnish (*q.s.*) about 2 ounces, to make a thin paste. (B) Copper Sulphate, Zinc Sulphate and Lead Acetate of each 40 grains, rubbed together. Mix A and B and add Linseed Oil 1 ounce. This has been used with success in bad cases of erysipelas.—Ph. Notes.

Plumbi Iodidum PbI_2=461·064.

Yellow crystalline powder. Used to reduce swellings. Very slightly soluble in water. 5 to 10% Ointment in skin diseases.

Plumbi Oxidum. *Syn.*—LITHARGE. PbO=223·2.

Yellowish-red powder (Massicot) or scales. To prepare Lead Plasters.

Minium, P. Belg., *Red Lead,* Pb_3O_4=685·6. Made by heating Massicot.

Plumbi Guaiacolas. *Syn.* LEAD GUAIACOLATE.

This compound has been prepared in the author's laboratories. It is a white powder containing 56% of lead. It is insoluble in water.

Theory for $Pb(OH)_2 \cdot Pb(C_6H_4OCH_3O)_2$ = 59·6%.

It may prove of value in medicine.

PODOPHYLLIN.

Syn. PODOPHYLLI RESINA.

Dose.—¼ to 1 grain (0·016 to 0·06 Gm.) as a cholagogue and aperient pill or tablet. Takes 8 to 10 hours before producing evacuation.

The resin from the dried rhizome of *Podophyllum peltatum—Berberidaceæ* (*B.P.* '14 and U.S.X.)—American Mandrake, or May Apple, sometimes called Vegetable Mercury as it is a powerful biliary purgative and may be combined with a small dose of calomel for treatment of gallstones. It is useful in removing *ankylostoma* and other worms. Yellowish powder, soluble in aqueous ammonia and almost completely in 90% Alcohol.

U.S.X. requires Podophyllin not less than 75% soluble in ether, and not less than 65% in chloroform.

Podophylli Indici Resina (*B.P.* '14). From *P. Emodi* (also *B.P.* '14). Is richer in Podophyllotoxin than that from *P. peltatum.*

Podophyllotoxin. $C_{20}H_{15}O_6(O.CH_3)_3+2H_2O=480{\cdot}224$.

Is the principal constituent of Podophyllin. It is more certain in its action than Podophyllin and is given in dose of $\frac{1}{10}$ to $\frac{1}{8}$ grain, to children $\frac{1}{60}$ to $\frac{1}{30}$ grain. It is best administered by dissolving 1 grain in 2 drachms of 90% alcohol. *Dose.*—8 to 20 drops in a teaspoonful of syrup.

For further details of this body, see Vol. II.

Ⓟ **Pilula Podophyllin Composita.**

Podophyllin $\frac{1}{4}$ grain, Barbadoes Aloes 1 grain, Capsicum $\frac{1}{2}$ grain, Dry Extract of Belladonna $\frac{1}{4}$ grain, Excipient *q.s.* for one pill weighing 3 grains. One or two form a biliary aperient dose.

Ⓟ **Pilula Podophyllin et Quininæ (Poore's Pill).**

Quinine Sulphate 1 grain, Podophyllin $\frac{1}{12}$ grain, Milk Sugar $\frac{1}{12}$ grain, Dry Extract of Belladonna $\frac{1}{6}$ grain, Extract of Aloes 1 grain. To make one pill, or, if the quantities be taken in grammes, 15 pills, weighing 3 grains: useful 'dinner pills,' must be taken *with* food.

Ⓟ **'Dinner Tablets'** are similar; weigh 3 grains. They are recommended not coated for prompt action.

Tinctura Podophylli (*B.P.* '14).

Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

Podophyllin 3·65% in Alcohol 90%.

Flavoring.—Syl Lavandulæ (double dose), Syl Amygdalæ Amaræ; Syrupus Zingiberis, Elixir Saccharini.

In dose of 2 to 4 drops in tea or coffee, taken night and morning, is useful in sick headache and biliousness, where the bowels and liver are sluggish in worried and overworked patients, and in chronic diarrhœa with cutting pains and high-coloured motions. Also relieves constipation with clay-coloured motions following diarrhœa of infants, 1 or 2 drops on sugar twice or three times a day.

Tinctura Podophylli Indici (*B.P.* '14) is also made same strength.

Tinctura Podophyllin Ammoniata.

Podophyllin 1, Aromatic Spirit of Ammonia 50. Dissolve. and after standing, decant. Is miscible with water.

Dose.—10 to 20 minims (**0·6 to 1·2 Cc.**), diluted, as a purgative and cholagogue. The sal volatile acts as a corrective.

POTASSIUM.

K=39·096.

Sources of Potash Salts.—Potassium Chloride is obtained from the Strassfurt mines, also as *Sylvine* at Mulhouse in Alsace, and could be worked commercially from Fellspars in Scotland.—Sir T. E. Thorpe, B.M.J. i./18,64.

Potassa Caustica, Potassii Hydroxidum. KOH=56·104.

Manufactured electrolytically or from the Carbonate and Calcium Hydroxide. White deliquescent sticks or cakes. (*B.P.* '14) not less than 85% pure. ***Soluble*** in water 2 in 1, and about 1 in 3 *w/v.* of 90% alcohol.

Incompatibles—Acids, metallic salts, and alkaloidal salts.

Antidotes.—Any dilute vegetable acid, fixed oils, stimulants; not stomach pump or lavage.

Given in mixtures as **Liquor Potassæ** (*B.P.* '14 5% *w/v.*), well diluted; also used as a caustic.

Liquor Potassæ *per os* caused remarkable improvement in cases of inoperable malignant disease.—D. M. Gall, L. i./24,1104.

A Liquor containing 5 Gm. of KOH in 100 Cc. has Sp. Gr. 1·045. P.G.VI. is 15% *w/w.*

Flavoring.—Syl Menthæ Piperitæ, Syl Amygdalæ Amaræ.

Liquor Alkalinus, Brandish.

Dose.—For adults, up to 2 drachms. For ages 14 to 18 years 2 drachms, for children ½ to 1 drachm diluted. All these doses should be given diluted with milk or syrup.

This liquor contains about 5% Caustic Potash. In scrofula.—Hager.

VIENNA PASTE.—Caustic Potash 5, Slaked Lime 6, made into a paste with Alcohol. Used as an escharotic.

Pasta Londinensis is similar. Caustic Soda and Unslaked Lime of each equal parts, rubbed together in a warm mortar—made into paste when required for use as a caustic.

Potassa Sulphurata (*B.P.* '14). Liver of Sulphur. Deliquescent yellowish brown masses, smelling of sulphuretted hydrogen. Used in skin affections. **Balneum,** 2 ounces to 15 gallons.

Unguentum Potassæ Sulphuratæ. Liver of Sulphur 1, Sodium Carbonate 1, Lard 8. For ringworm.

Potassii Acetas. $CH_3COOK = 98{\cdot}12$.

Dose.—10 to 60 grains (**0·6 to 4·0 Gm.**).

Deliquescent white crystals, masses or powder. Diuretic and uric acid solvent. Soluble in Water 2 in 1, in Alcohol (90%) 1 in 2.

Flavoring.—Syl Pini, Syl Lavandulæ, Syrupus Aurantii.

Uses.—Is given to render the urine alkaline and has been employed in puerperal eclampsia. Diuretic in dropsical affections and has febrifuge properties.

Mistura Diuretica, St. M.'s H.

Potassium Acetate 20 grains, Sodium Nitrite ½ grain, Spirit of Juniper ½ drachm, Tincture of Ginger 10 minims, Water to 1 ounce.

The following is a useful mixture:—Potassium Acetate 20 grains, Solution of Ammonium Acetate 2 drachms, Vinegar of Squill 20 minims, Infusion of Broom 2 drachms, Water ½ ounce.

Potassii Benzoas. $C_6H_5COOK.3H_2O = 214{\cdot}184$.

Dose.—15 to 20 grains (**1 to 1·2 Gm.**). White crystals. Soluble in water 1 in 1½ and in alcohol (90%) 1 in 20. Uric Acid Solvent.

Flavoring.—Syl Aurantii Floris, Syl Vanillæ; Syrupus Aurantii.

Potassii Bicarbonas $KHCO_3 = 100{\cdot}104$.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

White powder or crystals soluble 1 in water 4. Insoluble in Alcohol (90%). Antacid, diuretic, and Uric Acid solvent. It is most valuable in acute rheumatism.

Flavoring.—Syl Cinnamomi, Syl Lavandulæ.

Potassii Bichromas. $K_2Cr_2O_7 = 294{\cdot}192$.

Dose.—$\frac{1}{10}$ to $\frac{1}{5}$ grain (**0·006 to 0·012 Gm.**), in pill with Kaolin Ointment or in Capsule has been used in dyspepsia and gastric ulcer. Soluble 1 in 10 of water.

Antidotes. See **Antidotes to Poisons.**

In phthisis (2½ minims of 10% Solution in water) either alone or in a tonic mixture in a wineglass of water after food, at first twice and later three times

daily, produced improvement in several cases. May produce vomiting at first.—L. ii./10,1484.

Dermatitis may follow the contact of Potassium Bichromate with the skin of susceptible persons. This may be avoided by frequently rinsing the exposed skin with a saturated solution of Sodium Bisulphite and then water.—Jl. A.M.A., ii./25,850.

Potassii Bromidum, $KBr = 119 \cdot 012$.

Dose.—5 to 30 grains (0·3 to 2 Gm.). Slipule No. 0 holds 10 grains.

Colourless or white crystals with saline taste. Soluble in water 1 in less than 2, and in about 200 of alcohol 90%. It should be at least 97% pure.

Incompatible with Mineral Acids, Mercury and Silver Salts.

Flavoring—Glyl Rosæ, Syl Vanillæ; Syrupus Zingiberis, Extractum Glycyrrhizæ Liquidum.

Uses.—Hypnotic and sedative, and is given as a drink cure. Often given with other bromides, *cf.* Sal Bromatum, and with Chloral Hydrate, Arsenic or Belladonna.

EPILEPSY.—Potassium Bromide with Nux Vomica will keep a patient free from fits whilst treatment is persisted in.

In recent epilepsy should be given for a long period (not less than two years). If no benefit from 45 to 75 grains per diem some other remedy should be tried. (It is cumulative). Addition of Belladonna may be useful where there is incontinence.

The following mixture has been recommended:—

Potassium Bromide 1 ounce, Potassium Iodide 2 drachms, Ammonium Bromide 3 drachms, Ammonium Carbonate 1 drachm, Tincture of Calumba 1 ounce, Water to 6 ounces. One teaspoonful before each meal and three teaspoonsful at bedtime. If *petit mal* exists alone, or co-exists with complete epilepsy the dose of Ammonium Bromide must be increased and that of the other diminished.

BROMISM.—To avoid the onset give Fowler's Solution of Arsenic, and maintain the antisepsis of the bowels by purgatives and salol.

Patients saturated with Bromides exhibit anæsthesia of the palate —a little known but useful diagnostic. Tickling the palate with a feather is a good means of eliciting the information. The effect of Bromides is enhanced by adding Potassium Bicarbonate in doses equal to about a quarter of the total Bromide given.

Small doses, *e.g.* 5 grains once a day long continued are better than larger doses for shorter periods.—M. Craig, L. ii./17,979.

For erections in gonorrhœa 15 to 35 grains with Lupulin 1 to 2 grains and Camphor 1 to 2 grains in a cachet, two to four daily.—Pr. Apl. '09,543.

Puerperal eclampsia is treated with it combined with Belladonna.

Forty-five operations, including two gastro-enterostomies and two lip cancer operations, done under local anæsthesia from injection of a 1% solution of Potassium Bromide.—Jl. A.M.A., ii./25,235.

Tablets contain 5 and 10 grains.

Ⓟ Mistura Dysmenorrhœica, E.G.A.

Potassium Bromide 15 grains, Sal Volatile, Tincture of Hyoscyamus *a.a.* ½ drachm, Spirit of Chloroform 10 minims, Water to ½ ounce.

Ⓟ**Elixir Quinque Bromidorum.** Can. Form.

Potassium and Sodium Bromides of each 10, Ammonium Bromide 6, Calcium Bromide 3, Lithium Bromide 1, Tincture of Cannabis Indica 6, Aromatic Elixir, sufficient to make 120. Dissolve the Bromides in the aromatic elixir, add the Tincture of Cannabis Indica, and filter if necessary. *One drachm contains* 15 *grains combined Bromides*

Ⓟ**Mistura Bromidi et Digitalis. St.M's.H.**

Dose.—½ to 1 ounce (**15 to 30 Cc.**).

Potassium Bromide 20 grains, Digitalis Tincture 5 minims, Potassium Citrate 15 grains, Compound Tincture of Cardamoms ½ drachm, Chloroform Water to 1 ounce.

Potassii Carbonas.

Syn. SALT OF TARTAR. $K_2CO_3=138{\cdot}192$. *Dose.*—5 to 20 grains (**0·3 to 1·2 Gm.**).

White deliquescent powder. Soluble in water 4 in 3, insoluble in alcohol 90%. Employed externally; internal properties similar to those of the Bicarbonate. Commercially contains about 16% H_2O.

Potassii Chloras. $KClO_3=122{\cdot}553$.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**).

Manufactured by passing chlorine into water holding lime or magnesia in suspension, treating the clarified liquid with Potassium Chloride, and crystallising the resulting chlorate from the liquor. Colourless crystals with saline taste. ***Soluble*** in water 1 in 16.

Incompatible with Oxidisable substances, Ferrous Salts, Sugar, Nitrites, Calomel, Hypophosphites, Vegetable Powders, Potassium Iodide.

Uses.—Antiseptic and a powerful oxidising agent. Is useful in stomatitis *e.g.* in children and in sore mouth arising from Mercurial treatment. Must not be given when the kidneys are diseased.

Poisoning by 20 Gm. Transfusion of defibrinated human blood tried. Death.—L.ii./07,1175.

Poisoning by 40 Gm. Potassium Chlorate. Recovery following transfusion of 200 Cc. of whole blood, followed by second transfusion after 3 days.—B.M.J.E., i./26,30.

Water sterilisation by Chlorine liberated from, *vide Vol. II.*

Lozenges weighing 20 grains, and **Tablets** weighing 5 grains, **plain and** Ⓟ **with Borax and Cocaine** $\frac{1}{260}$ grain, are useful to allay irritation and improve the voice. Gargle, spray, mouth wash may be 2% strength. Chlorine Gargle is made from it.

Pulvis Potassii Chloratis Compositus, C.L.T.E.

Potassium Chlorate, Borax, Sodium Bicarbonate, equal parts. Forms the solids of :—

Collunarium Potassii Chloratis Compositum, C.L.T.E.

Directions.—One teaspoonful to be dissolved in a quarter pint (½ tumbler) of tepid water. Half of the solution to be injected with a syringe along the floor of each nostril night and morning. Afterwards blow the nose freely.

Chloratifrice, a tooth paste, contains this Salt. For spongy gums and to prevent Tartar and act as a general antiseptic.

Potassii Chloridum. $KCl = 74{\cdot}553$.

Has been advocated for use in place of table salt by gouty and rheumatic individuals; the following is better to taste :—

Pulvis Potassii et Sodii Chloridi Compositus.—*Oliver.* Potassium Chloride 16, Sodium Chloride 8, Lithium Benzoate 1. A half-drachm measureful to be taken.

The late Sir W. Roberts advocated Potassium Chloride for increased arterial pressure. Oliver found a tendency to indulge in the use of salt in advancing age (over 65). When Potassium is ingested in excess of Sodium, a loss of the latter takes place from the system.

Table Salt containing 50% each Sodium and Potassium Chloride, to automatically supply Potassium salts lost in the preparation and cooking of food. Apart from the problematical relation of Potassium deficiency to Cancer, Potassium is a valuable addition to dietary and effective in preventing gout and rheumatism.—F. S. Rose, P.J., ii./26,411.

Potassii Citras. $C_3H_4(OH).(COOK)_3, H_2O = 324{\cdot}346$.

Dose —15 to 60 grains (**1 to 4 Gm.**).

A white powder obtained from citric acid and potassium carbonate.

Flavoring.—Syl Anisi; Elixir Saccharini; Syrupus Pruni Virginianæ.

Uses.—It has diaphoretic, diuretic, and febrifuge properties. Also for gout, and in enuresis where the urine is over-acid. Large doses are useful for the acidæmia of diabetes.

ŒDEMA in disease of the gastro-intestinal tract in infants removed. Appears to act better than other diuretics.—Pr. May, 1911, p. 686.

NEUROTIC DYSPEPSIA.—Sip early in the morning a tumbler of hot water containing a teaspoonful of it.—B.M.J. ii./11,1529.

LACTATION improved by 15 grain doses.—B.M.J. i./17,765.

' Vescettes ' of Potassium Citrate, 15 grains.

To be crushed and taken in a draught of warm water.

$\boxed{\mathbb{P}1}$**Potassii Cyanidum** $KCN = 65{\cdot}104$. FR. CX.

Dose.—$\frac{1}{12}$ to $\frac{1}{4}$ grain (**0·005 to 0·016 Gm.**).

FR. CX. has *mar. single dose* $\frac{1}{6}$ grain. Max. during 24 hours $\frac{5}{8}$ grain.

A crystallised salt or in fused masses.

Antidotes.—See Acid Hydrocyanic.

$\boxed{\mathbb{P}1}$TRADE VARIETIES. In addition to the *B.P.* '14 salt (about 90% pure) are '**Gold Cyanide**' 98 to 100%, really a double Cyanide of Potassium and Sodium, but, we understand, the *B.P.* '14 article is also used for gold extraction. 30% pure is supplied in sticks; this is 'silver cyanide,' for silver extraction.

Potassii Ferrocyanidum.

$K_4Fe(CN)_6,3H_2O = 422{\cdot}320$.

Dose.—8 grains (**0·5 Gm.**). Said to be physiologically almost without action.—P.J. ii./05,924.

Potassii Iodidum. $KI = 166{\cdot}028$.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**)—often much increased.

In white or colourless cubic crystals or **Small Granular Crystals** soluble in less than its own weight of water, and in 12 parts of Alcohol 90%.

A slightly alkaline solution keeps better than an acid one. ***Incompatible*** in solutions with Spiritus Ætheris Nitrosi, Salts of Iron (except Ferri et Ammonii Citras and Liquor Ferri Acetatis), Salts of Bismuth, Lead and Mercury, with Liquor Strychninæ Hydrochloridi, with Quinine Sulphate and other alkaloidal Salts, Silver Nitrate and Potassium Chlorate.

Flavoring.—Syl Lavandulæ, Glyl Menthæ Piperitæ, Syl Vanillæ, Extractum Glycyrrhizæ Liquidum, Syrupus Zingiberis.

Uses.—In universal use in the later stages of syphilis, in arteriosclerosis and certain cases of gout and rheumatism.

For actinomycosis it is specific; very large doses are given. In one case (severe) it was only when the dose reached 240 *grains daily* that *improvement began.* Carbolic Lotion 1 in 80 was quite sufficient locally. THOMASSEN'S METHOD is 10 grains thrice daily for the first *week*, 15 grains the second, and 20 grains the third, increased to 35 grains. Sporotrichosis and blastomycosis, also respond.—A. Castellani, L. i./20,943.

In actinomycosis *not* found effective.—Colebrook, B.M.J. i./22,74.

RHEUMATOID ARTHRITIS best treated by 10-grain doses thrice daily with Guaiacol Carbonate.—A. P. Luff; *see* also p. 447.

In fibrositis it is perhaps the most valuable drug. It appears to act by removing the hyperplasia and serous exudation in the fibrous tissues. Full doses (10–12 grains) with Nux Vomica or Syrup of Glycerophosphates.—A. P. Luff.

Administration of Potassium Iodide in large doses is a survival of the old AIX-LA-CHAPELLE TREATMENT for late specific lesions—quite unabsorbed. Free Iodine is less irritating than Potassium Iodide or Sodium Iodide in large doses. 10 grains of Potassium Iodide thrice daily for less than a week has produced violent catarrh with discharge from eyes and nose, swelling of eyelids and pustular eruption. Tincture of Iodine 5m. thrice daily is well borne.—'Indian Physician,' C.D. April 2,21,475.

Absorption.

In rheumatism, Potassium Iodide must be taken internally. It is rapidly absorbed from the mucous membrane, but not by the skin. The liniment of Potassium Iodide with soap and the ointment of Potassium Iodide are a waste.—D. Grieve, C. & D., Dec. 1921, p. 856.

Potassium Iodide solution, even with soap present, is not absorbed by the skin, but when applied as an emulsion in such substances as Vaseline, Lanoline and Stearic Acid, it can be detected in the urine within 12 hours.—J.C.S., A.i./25,1116.

ASTHMA is treated by Potassium Iodide in 5-15 grain doses twice or thrice daily. Extract of Stramonium may be added. Reliable both during the paroxysms and in the interval.—Yeo.

In ANEURISM moderate to full doses.—Yeo. The addition of Ammonium Bromide is often useful.

In ARTERIOSCLEROSIS 3 to 5 grain doses thrice daily with Potassium Bicarbonate 5 to 10 grains, Sal Volatile 20 minims, and an ounce of Gentian Infusion continued for four months at a time with interruptions of ten or twelve days. One or two tablets of Nitro-glycerin as well to promote vascular relaxation.—Yeo.

MIDDLE EAR DISEASE in dry forms.—B.M.J. ii./04,1206,1209.

In TINNITUS AURIUM associated especially with vertigo, due to labyrinthine disease, may be used in large doses.

Acute PAROTITIS favourably treated by painting the swelling with Iodine and giving Potassium Iodide internally.—B.M.J. i./06,81.

Obstructive LYMPHANGITIS well treated with Potassium Iodide.—S. L. Rodriguez, per Clin. Jl., Feb. 14/23,83.

TUBERCULOUS EXPECTORATION is greatly assisted by its use.

In LOBAR PNEUMONIA for the combined use of Potassium Iodide and Creosote, *vide* **Mistura Creosoti et Potassii Iodidi.**

In BRONCHIAL AFFECTIONS the Iodides cause a watery exudation through the bronchial mucous membrane, hence of utility.

✱**Salodine** (T.M. 453,485, Cl. 42) is an **Iodised Table Salt.** Suitable for use as a goitre prophylactic. Both for the table and cooking purposes.

Exophthalmic goitre, discussion on. Small doses of Iodide, *e.g.* Sodium Iodide 3 grains daily, for 10 days each spring and autumn found efficacious in girls in reducing the number of cases of goitre in districts where it is endemic, and it is not unreasonable to expect that by reducing the tendency to *simple goitre in early life,* we may also lessen the number of cases of *Graves' disease occurring in later life.* This preventive treatment is, however, quite *unsuited for those who already show signs of hyperthyroidism.*—G. R. Murray, B.M.J. ii./22,908. Speakers differed on the question of Iodide treatment.

Goitre is endemic in the valleys of E. & N.E. Lancashire. 2½ or 3 grains of Sodium Iodide thrice daily for six weeks, then discontinued for a month and resumed indefinitely. Large goitres disappear.—R. Stewart, B.M.J. ii./21,843.

Iodine (Potassium Iodide) in small doses will prevent and cure simple goitre. CHLORINE to some extent also prevents thyroid enlargement. Iodine deficiency comes about through absence of Iodine from food, vegetables, etc. —R. McCarrison, B.M.J. i./22,636.

GOITRE AND CALCIUM have obvious relationship. The viscosity of the thyroid secretion varies immensely. This depends on its Iodine content. In limestone districts (Switzerland and DERBYSHIRE) large goitres containing thick colloid are usual. This 'colloid' is poor in Iodine. These goitres vanish under use of Iodine or Thyroid preparation rich in Iodine. The Iodine combines with the Calcium to form Calcium Iodide.

Further, fat taken above normal requirements will form soaps with the fatty acids combining with all the Calcium (and other alkalies) present. This will lead to Calcium starvation. The part played by fat in the production of goitre is only a link in the chain of Calcium absorption or starvation.—S. Pern, B.M.J. ii./22,532.

SWITZERLAND is attacking the goitre problem. CHATIN'S HYPOTHESIS (enunciated in 1850) is thought to be correct there, namely that it is correlated with a low Iodine content of drinking water.

Baumann concluded that the (goitrous) thyroid gland seeks, by increase in size and surface to make up for the lack of Iodine in neighbourhoods where the supply is scanty. Chatin demonstrated how *poor in Iodine is the water in Alpine Valleys.* The same has been found in U.S.A. The sea spray is thought responsible for carrying the Iodine hundreds of miles from the sea coast and from the Great Salt Lake.

Dosage.

As small an amount as 0·1 mgr. of Potassium Iodide thought to have anti-goitrous action. Table salt could be used dietetically. '**Vollsalz**' containing 0·25 to 0·5 Gm. Potassium Iodide to every 100 kilos in use in the Canton of Appenzell. A sensible measure.—L. i./23,660.

The Swiss Goitre Commission (1922) after exhaustive investigations fixed the maximum amount as 1 part Iodine in 200,000 parts of salt. This is the amount adopted in this country. Marine in the U.S.A. advises 1 in 500 in mildly goitrous districts.—J. A. Goodfellow, B.M.J., i./25,331.

The amounts of Iodine recommended by the Swiss Commission are too small for goitrous districts. Five to 10 mg. of Iodine weekly is sufficient for prevention among school-children, and 10 mg. per week should be given during pregnancy and lactation.—Medicine, 1924,3,453, per P.J., i./25,546

Promising results obtained in Graves's disease with a daily dose of 15 drops of 1 in 20 aqueous solution of Potassium Iodide, containing 0·0033 Gm. Potassium Iodide per drop.—B.M.J.E., ii./24,49.

A normal thyroid contains a relatively higher quantity of Iodine per Gm. of gland than a goitrous one, and the Iodine content is rapidly increased in many forms of goitre during administration. Small doses of Iodine or Thyroid to be given three times a day over a long period.—Beebe, B.M.J.E. ii./21,29.

Sweets containing 1/10 grain of Iodine given every 5 days are a good preventive measure for children, and in many cases sufficient to effect a cure. The aim should be to ensure that the thyroid receives its normal Iodine requirement, which is about 2 grains per year. Most cases of nocturnal incontinence also cured by the use of these sweets.—K. Fraser, Cumberland, School M.O. Report, 1925.

A trial in several Derbyshire schools with these Iodised sweets, each containing Iodine 1/10 grain as Sodium Iodide, gave unsatisfactory results both in prophylaxis and treatment of goitre, and the method is not recommended.—P. H. J. Turton, L. ii./27,1170.

Iodine as remedy for goitre is of great antiquity: in the form of burnt sponge, it was used even in Galen's time.—F. Redlich, W.K.W., Oct. 8, '25, 1102, per Pres., May '26,184.

Iodine given over long periods without thyroidectomy does not cure exophthalmic goitre. Use of Lugol's Solution prior to operation increases percentage of patients who can be operated on in one stage.—H. M. Clute, Jl. A.M.A., Jan. 9, '26,105.

Iodine deficiency theory in goitre unproven. The Iodine treatment should be carried out with discrimination, not by wholesale medication.—W. M. Ash, L. ii./26,1022.

Number of cases of Iodine hyperthyroidism greatly increased since discovery of efficacy of Iodine in exophthalmic goitre.—Am. Jl. Med. Sci., per Jl. A.M.A., ii./25,1161.

Hyperthyroidism resulting from use of Iodine in goitres of long standing. Dosage should be considered in terms of milligrams rather than of grains, the ***maximum dosage for an adult being 10 mg. daily for not longer than one month,*** the patient being kept under very close observation during this time.—O. P. Kimball, Jl. A.M.A., ii./25,1710.

Glasgow, which gets a pure supply of water from a highland lake, is immune from goitre. The turbid water of some of the Swiss glacier rivers and of the Himalayas are associated with goitre but the actual poison is not proved—possibly it is in the minute particles of inorganic mineral matter generally of a calcareous nature.—Sir James Berry, L. i./26,269.

It is not clear that all endemic goitres are of the same order, or due to the same cause, and no agreement as to the amount of Iodine required to prevent simple goitre has been reached. The use of Iodine in experimental work in **New Zealand** was not conclusive in prevention. The goitre problem seems to be a domestic one for each locality.—B.M.J., i./25,321.

Iodine over a long period should not be given to adults and when used periodically frequent observations of the pulse and weight should be made. Under no circumstances should Iodine be administered to adults with fetal adenomas, with or without symptoms of hyperthyroidism, except for short period prior to operation. Instances of the dangers of exciting hyperthyroidism given.—C. L. Harstock, Jl. A.M.A., '26,1335, per P.J., ii./26,303.

Roy. Soc. Med. discussion on Iodine therapy in exophthalmic goitre.—B.M.J., i./26,478.

In exophthalmic goitre it is *to be avoided.* **Iodine is being poured into the system in excess by thyroid secretion.**—B.M.J. ii./05,1249.

See also Sodium Iodide, p. 775 *and Endemic Goitre,* p. 918.

Chlorination of Drinking Water is objected to by James Oliver (M.P.C., July 6, '27). While realising the difficulties of supplying London with its needs, we must admit we agree with this authority. It cannot of course be proved that such chlorination, causing ***possible elimination of or deficiency in Iodine,*** may tend to an increase of goitre, but our view is that there is a chance of it, and the needful Iodine should be conserved. The town dweller should not be deprived of his supply.

Cows fed with Iodised Sodium Chloride have been stated to produce more and better quality Milk.—P.J., ii./25,402.

Animal nutrition—importance of Iodine in experiments with pigs. Complete mineral salts added to the feed at the rate of ½ ounce per head per day, *containing Potassium Iodide,* give better results than the incomplete salts (Potassium Iodide omitted). There is less Iodine in water in chalky districts, *i.e.,* in water containing an abnormally high proportion of Lime. —J. C. Rushton, Staffs. Farm Institute, Penkridge, Stafford.

The importance of the place of Iodine in life and nature is dwelt upon in a pamphlet by S. L. Bensusan from the aspect of nutrition of animals and plants, public health, and medicine.—De Gruchy & Co., Ltd., 48, Mitchell Street, London, E.C. *See also* 'Iodine for Live Stock,' by F. E. Corrie.

Foot and Mouth Disease.

Painting with Iodine said to be valuable—both curative and preventive. Resistant powers of the animal depend on the functional integrity of the thyroid gland. The disease has been prevented in foals by feeding Iodine to the mare during gestation and thus transmitting to the offspring. It has been stated that the colostrum of both human and animal mothers, as compared with the later milk, shows a remarkably increased percentage of Iodine —a natural provision for the growth, health, and resistance of the offspring. Many farming areas are void of Iodine in soil and vegetation. Iodine painted on put an end to navel-ill. The ingestion of Iodine advised. 6 to 8 ounces Potassium Iodide mixed with 100 lbs. salt to be placed where cows have access to it. For pregnant mares 1 teaspoonful Potassium Iodide in the feed twice monthly.—Trans. Highland & Agric. Soc., Vol. XXXVI., 1924.

Sterules, Hypodermic, of **Potassium Iodide** contain 5 grains.

Pilula Potassii Iodidi.—Contains 1 grain or more.

Potassium Iodide 1 grain, Sodium Carbonate Exsiccated ⅛ grain, with Tragacanth and Syrup. **Tablets** and **Capsules** contain 5 grains.

Potion Iodurée

Potassium Iodide 0·5 Gm., Syrup of Orange 25 Gm., Distilled Water 100 Cc., to be taken in three portions during the day.

Linimentum Potassii Iodidi cum Sapone (*B.P.* '14).

Mix fresh Curd Soap in fine shreds 16 with Water 80, and Glycerin 8, in a porcelain dish on a water bath. When dissolved, pour the liquid on to Potassium Iodide 12 in powder in a mortar. Triturate briskly until cold. Set aside 1 hour; and add Lemon Oil 0·8.

Iodine cannot be traced in the urine after its use—*cf.* p. 713.

A soft **jelly-form Liniment of Potassium Iodide and Soap** may be produced with Soft Soap ½, Potassium Iodide 1½, Glycerin 1, Water 10. The following is somewhat stiffer: Soft Soap 1, Potassium Iodide 1½, Glycerin 1, Water 10.—P.J. ii./04,376.

Potassii Nitras KNO_3=101·104. *Syn.* NITRE. *Dose.*—5 to 20 grains (0·3 to 1·2 Gm.). Should be given well diluted.

Flavoring.—Syl Rosæ, Glyl Lavandulæ, Syrupus Tolutanus.

Uses.—Diuretic, to be given in dilute solution with caution. Its chief use is in the preparation of powders for burning in asthma.

In chronic PERICARDITIS great alterations in the area of dulness may follow the employment of diuretics such as preparations of Potassium Nitrate, Squill, Digitalis or Scoparium.—Tirard, Med. Treatment.

In PNEUMONIA has been tried in full doses. The diet should be salt-free. The effect is remarkable; temperature falls in a few hours. Give 60 grains in solution every 3 hours for the first day, and then gradually reduce the dose each succeeding day. To increase circulation in the lungs nitroglycerin $\frac{1}{100}$ to $\frac{1}{50}$ gr. every three hours.—H. G. Hughes, N. Y. M. Jl., Sept. 9,1911, Pres., Dec., 1911, p. 300. For further abstract of this paper see Edn. XVIII., p. 701.

Poisoning by Potassium Nitrate.—B.M.J. i./11,1,052.

Antidotes. See **Poisons and Antidotes.**

Fumus Potassii Nitratis (Nitrated Papers).

White blotting-paper, impregnated with 20% Nitre solution. To relieve asthma these are burnt and the fumes inhaled.
Asthmatic Pastilles are prepared in cones containing a mixture of chlorate and nitrate of potassium.

Ⓟ**Pulvis Lobeliæ Compositus.** ASTHMA POWDER.

Potassium Nitrate 240, Boiling Distilled Water 240. Dissolve and add to Lobelia in powder, Stramonium Leaves in powder, Black Tea in powder, 240 of each. Mix well, dry, and add Oil of Anise 1. The fumes of half a teaspoonful or more to be inhaled six or eight times a day and the bedroom fumigated with same. ✱Himrod's Cure (T.M. See 169003 and 25857) Bliss's Cure, and the Green Mountain Cure resemble the above.

Ⓟ**Potter's Asthma Cure** contains 30% Stramonium and 15% Lobelia.—P.J. i./28,528.

Ⓟ**Asthmatic Cigarettes** contain Stramonium treated with Nitre.

B P1 **Cigarettes d'Espic** are said to be made of the following ingredients:—Belladonna Leaves 5½, Hyoscyamus Leaves 2¾, Stramonium Leaves 2¾, *Phellandrium Aquaticum* 1, Opium Extract 1⅛, Cherry Laurel Water a sufficiency and a little Potassium Nitrate.—Yeo.

Ⓟ**Dr. Blosser's Remedy** (Cigarettes) contains 18·5% Stramonium.

Exibard's Abyssinian Powder contains plant powders and balsams.

✱**Garfield's Tea** (T.M. 282807). is stated to have the formula:—Senna 30%, Couch Grass 33%, Balmony 26⅔%, Dandelion 3%, Centaury 3%, Pellitory 3%, Mallow 3%, Chamomile ⅓%, Hyssop 3%, Peppermint 1%.

Effervescent Potassic Aperient.

Dose.—One drachm in half a tumbler of warm water.

A preparation containing **Potassium Sulphate** $K_2SO_4=174·27$ Suggested as an alternative to Sodio-Magnesian Aperient (*q.v.*) also prepared with **Potassium Sulphocarbolate** 10 grains in a *dose* as (above). Useful in gastric and intestinal fetor.

Foul smelling evacuations treated by Calomel ⅙ to ¼ grain at night followed in the morning by a dose of this.—H. J. Thorpe, B.M.J. ii./12,344.

Potassium Sulphate 0·25 to 0·5% added to local anæsthetics whether by spinal injection or peripheral blocking of nerves enhances anæsthesia.—Col. H. M. W. Gray, B.M.J. i./16,5

Potassii Nitris. $KNO_2=85·104$. *Dose.*—¼ to 1½ grains.

A crystalline deliquescent powder. It is a vasodilator, improves the cerebral circulation and is given for migraine, asthma and epilepsy.

Pulvis Potassii Nitritis Compositus.

Potassium Nitrite ½ grain, Potassium Nitrate 18 grains, and Potassium Bicarbonate 25 grains; mix and dispense in parchment paper. This dose may be given every morning in a tumbler of water to reduce blood pressure; is diuretic. Has thus checked recurrent epistaxis. Should be tried for gout.

Pulvis Sodii Nitritis Compositus.—Brunton.

Sodium Nitrite ½ to 2 grains, Potassium Nitrate 10 to 20 grains, and sometimes Potassium Bicarbonate 10 grains—in a tumbler of water every morning—to reduce blood pressure. May be taken for years.

Potassii Phosphas. **Di-potassic Hydrogen Phosphate.** $K_2HPO_4=174{\cdot}227$. *Dose.*—1 to 10 grains (**0·06 to 0·6 Gm.**).

A deliquescent granular powder; is given as an alterative in phthisis and urinary affections.

Potassii Phosphas Acidus. DI-HYDROGEN POTASSIUM PHOSPHATE, MONO-POTASSIUM PHOSPHATE, $KH_2PO_4 = 136{\cdot}139$.

Dose.—15 to 60 grains (**1 to 4 Gm.**).

Colourless crystals, readily soluble in water with acid reaction.

Sal Polychrestum. *Syn.* **Glaser's Salt.**

Dose.—30 to 120 grains (**2 to 8 Gm.**).

A mixture of Potassium Sulphite and Sulphate, has a sulphurous odour, has been given for dyspepsia and for chronic skin diseases.

Sal Enixum is Potassium Bisulphate. $KHSO_4=136{\cdot}168$.

Potassii Sulphocyanas (Sulphocyanide). $KCNS=97{\cdot}168$.

Dose.—¾ to 3 grains (**0·05 to 0·2 Gm.**). Not legally $\boxed{\text{P1}}$ or Ⓟ but to be supplied with caution.

Has been employed as antispasmodic and anodyne—in phthisical cough and catarrh, dyspnœa, and mania.

Tooth Powders, Pastes and liquid Dentifrices. Suggested use of this or other alkaline sulphocyanide in neutral media. For powder 1 to 14 of precipitated chalk. For liquid dentifrice 1 to 8 of alcohol. Subject of patent,—F J. Rhodes, No. 20879 of 1914.—P.J. ii./15,362.

Potassii Tartras.—**Normal or Neutral Potassium Tartrate.** $(CHOH)_2COOK.COOK, \frac{1}{2}H_2O. = 235{\cdot}232$.

Dose.—30 to 240 grains (**2 to 15 Gm.**).

Crystalline powder with bitter taste made by neutralising Acid Potassium Tartrate with Potassium Carbonate. Has purgative and diuretic properties.

Soluble.—About 5 in 3 of water.

Potassii Tartras Acidus. (*B.P.* '14)—*Syn.* **Potassii Bitartras.** PURIFIED CREAM OF TARTAR. $(CHOH)_2COOK.COOH=188{\cdot}113$.

Dose.—15 to 60 grains (**1 to 4·0 Gm.**).

The crude tartar deposited during the fermentation of wine—recrystallised. A white powder with acid taste soluble 1 in 200 of water. Diuretic and cathartic. Is employed in acute renal disease. Where the urine is thick and alkaline, this salt neutralises and produces normal appearance.

PUERPERAL ECLAMPSIA.—The convulsions may be the signs of œdema of the brain, hence aim at treating the œdema rather than the defect of the kidneys. Very small frequent doses of Potassium Bitartrate caused increased diuresis in a case and effected cure of eclampsia.—B.M.J.E. i./13,70; B.M.J. i./13,1207.

Haustus Imperialis, K.C.H., **Imperial Drink.** Potassium Bitartrate and Tartaric Acid of each 1 ounce, Sugar 16 ounces, Lemon Oil 12 minims, Boiling Water 1 gallon.

Carbuncle on the neck was treated by Cream of Tartar Powder as a dressing. Renewed from time to time and irrigated with sterile water

Potus Imperialis, G.N.C. Lemon Syrup 1½ ounces, Acid Tartrate of Potassium 1 drachm, Water to 20 ounces.

Potassii Boro-Tartras. SOLUBLE CREAM OF TARTAR.

Dose.—20 to 40 grains (1·2 to 2·5 Gm.).

An amorphous white powder. Potassium Acid Tartrate 5, Borax 2. Dissolve with heat in water, *q.s.*, and evaporate to dryness.

Soluble to extent of 1 in 1 of water.

Uses.—Similar to that of Cream of Tartar.

Epilepsy has been treated with it—as much as 3 Gm. daily, sometimes combined with Bromide.—B.M.J.E. i./22,57; L. i./22,446; Pres. Feb. 21, 68, Jan. '23,23.—*cf.* Sodium Borate.

QUINIDINE, CINCHONIDINE, CINCHONINE

AND CINCHONA FEBRIFUGE.

The **Medical Research Council**, Special Report No. 96, 1925, concludes that Quinidine *is at least as efficacious as Quinine in malaria.* There is no indication of a preferential action of Quinidine on benign tertian, or of Quinine on subtertian infections. The depressant action of Quinidine on heart muscle may, however, limit its use. A mixture of the crystallisable Cinchona alkaloids might replace Quinine and be of great value as well as being cheaper.—B.M.J. ii./25,488. L. ii./25, 510. C. & D. ii./25,434.

Curative effects of Quinine, Quinidine, and Cinchonine found the same for all forms of malaria and, except for the greater cardiac depression caused by the last, no difference in toxicity.—Dale and James (First Internat. Malaria Conf., Rome). B.M.J. ii./25,970.

These findings negative, in part, the opinions of Hugh W. Acton (L. i./22, 124,283) who held the view that all the various (14 or more) closely related alkaloids in Cinchona Bark exert a destructive action on the malarial parasite, but differ in the degree of destructive power. According to him, in *benign tertian* infection (which constitutes some 50 to 75% of cases—in India and in England among returned troops it is practically the only malarial infection seen), dextro-rotatory Quinidine is more efficacious than the lævo-rotatory Quinine.

The isomeric relationship between Quinine and Quinidine has been pointed out, and as Quinine is lævo-rotatory and Cinchonine dextro-rotatory it seems probable that Quinine (generally regarded as a methoxy derivative of Cinchonine) is not derived from the last mentioned. The correct relationship may be viewed by dividing into 2 series, thus:—
Cinchonidine Series = Cinchonidine, Cuprein and Quinine.
Cinchonine Series = Cinchonine, Cupreidine and Quinidine.

Continuing with Acton's views, the dextro-rotatory ('Cinchonine series'), are more powerful than the lævo isomerides—the Cinchonidine series. The hydro alkaloids are more stable and more active in many respects than the natural alkaloids. The higher members of both series are more toxic to mammals, protozoa and bacteria than the lower members. Parasiticidal action can only be arrived at by direct observation on malaria patients.

In a previous paper (L. i./20,1257) Maj. Acton pointed out that malarial fever should be regarded, not as one disease, but a group of three different fevers due to three distinct parasites, and two at least of these, in his opinion, require different alkaloids of Cinchona Bark.

Chincona Febrifuge.—A preparation containing the total alkaloid from Cinchona Bark made at the Government factories in India issued in 3½ grain tablets is described by Acton as composed of:—

		Per cent.
Crystallisable alkaloids	Cinchonine ..	18·58
	Cinchonidine ..	5·84
	Quinine	7·4
	Quinidine ..	22·83
Non-crystallisable alkaloids ..	"Quinoidine" ..	29·12
Ash		16·23

The tablets contain Magnesium Sulphate to assist in manufacture, hence the large amount of ash. Those made by the author do *not* contain this addition.

The crystallisable alkaloids are the important ones therapeutically.

Quinidine Sulphate, 10 grains *per os* twice daily for 21 days, gave cure percentage 62·9, and Cinchonidine Sulphate 63·1. The efficacy of the total alkaloids is thought to be dependent on the **Quinidine** content or the **Cinchonidine-Quinidine** Mixture.

Maj.-Gen. Hehir finds benign tertian forms probably *over* 75% of cases met with, and not 50%.—L. i./20,1382.

The products of Cinchona in the treatment of malaria.—B.M.J., i./26,154.

A further assay of Cinchona Febrifuge showed similarly to above figures, but Cinchonine 24%, Amorphous Alkaloids 38·5%, and ash 2·6%, approx.—Howard, Y.B.P., 1923,639.

M. Nierenstein finds that if a 10% solution of Quinine Sulphate is heated 1 or 2 hours the solution turns dark and its specific rotation falls from —164 to —43° with formation of Quinotoxin probably. If the solution is heated, however, in the presence of Carbon Dioxide or Hydrogen the rotation alters from —164 to +58°. In this latter case the Quinine is perhaps partly isomerised to Quinidine.—L. i./20,1386.

The following formula is said to be superior to any other in prophylaxis and superior to Quinine in chronic cases of malaria fever as a remedial measure: Powdered Cinchona Febrifuge 10 grains, Citric Acid 20 grains, Magnesium Sulphate 20 grains, Spirit of Anise 10 minims, Syrup to ½ ounce. Dose, ½ ounce 2 hours after meals.—T. H. Bishop, I.M.G., Dec. '24,644, *ibid.* April, '25, 193.

Benign tertian malaria well treated with a similar mixture. Cheap and suitable for mass treatment.—O. A. R. Berkeley-Hill, I.M.G., July, '26,333.

Cinchona Febrifuge. Warning against deficiency in alkaloids or presence of harmful ones.—L. i./23,148.

Quinidina. $C_{20}H_{24}N_2O_2$=324·208.

When crystallised from Alcohol, the base contains 1 molecule Alcohol of crystallisation. The Alcohol is completely removable at 120° C. Quinidine free from water and Alcohol melts at 168° C. When crystallised from boiling water it contains $1\frac{1}{2}H_2O$.

Quinidine is soluble 1 in 2,200 in water, 1 in 750 boiling water, 1 in 30 Alcohol 90%, 1 in 20 Ether.

Its solution in Sulphuric Acid has a blue fluorescence, as in the case of Quinine, and it gives a similar Thalleioquin reaction. It differs from Quinine in M.Pt., and its Acid Tartrate and the Hydriodide are only slightly soluble.

Quinidinæ Sulphas. U.S. X., Ph. Ned. V. $(C_{20}H_{24}N_2O_2)_2.H_2SO_4 + 2H_2O$ = 782·528.

Dose.—5 to 10 grains (0·3 to 0·6 Gm.). U.S. X. states 5 grains four times a day as average. Slipule No. 00 holds 6 grains. For auricular fibrillation an average is 6 grains (0·4 Gm.), thrice daily.

Occurs as needle crystals, ***soluble*** about 1 in 100 in water (according to our experiments).

Uses.—In addition to its efficacy in malaria, Quinidine, alone or in combination with Cinchonidine (*vide* Preparations *infra*) should be tried in all forms of fever, and wherever Quinine has been used hitherto, *e.g.*, in influenza, neuralgia, nervous headache, common catarrhs and as a general tonic.

Quinidine undoubtedly superior to Quinine Hydrochloride in cases which resist Quinine.—Hans Ziemann, per Chininum, 72.

Quinidine is believed to have specific effect in ***auricular fibrillation*** of the heart.

References to treatment of Auricular Fibrillation.

By FIBRILLATION is meant an incoordinated, tremulous and flickering movement of the muscular wall of the auricles, which is in a state of continual agitation. The fibrillating auricles might be compared with the weak fibrillary twitchings which occur in the muscles of the body when they are undergoing paralysis and atrophy. The fibrillations of the auricles may amount to as many as 500 a minute; the ventricular rate may be 120, 140 or even 200 in rare cases. Many of the impulses fail to excite any ventricular contraction.

Tinct. Digitalis 10 minims every 4 hours or 15 minims every six hours should be given daily, carefully watching the effect by counting the pulse twice a day by auscultation. One should endeavour to find the daily quantity necessary to keep the heart about normal rate. Some patients feel best when the heart's rate is kept as low as 50.—C. H. Cattle, B.M.J. i./21,521. See also Oliver-Sharpey Lecture by Thomas Lewis.—*ibid.*, 551.

Auricular flutter associated with arrhythmia perpetua or delirium cordis treated by Quinidine. In one case 15·5 Gm. had to be given before the arrhythmia could be controlled. Usual dose to begin with, 0·3 Gm.—slowly increased. As much as 2 to 3 Gm. can be given in 24 hours.—B.M.J.E. i./21,85.

A study of 400 cases.—D. S. Brachman, L. i./21,374.

Quinidine Sulphate thought to have definite power to terminate paroxysms by restoring normal rhythm. The percentage of successful cases has varied up to 66%. A record of 13 cases. Dose 0·4 Gm. given in gelatin capsules, thrice daily. This amount found to be sufficient to ensure a progressive retardation of auricular rate for the first few days. Majority of successfully treated cases re-established normal mechanism. Quinidine has a remarkable action on the auricle and the action is of a potent nature.—A. N. Drury and C. C. Iliescu, B.M.J. ii./21,511–515.

Auricular fibrillation of itself not a dangerous or serious disease. Quinidine not free from danger.—J. Mackenzie, B.M.J. ii./21,576.

Return to normal cardiac rhythm in some cases. Its use is not without danger, the risk of embolism being a real one. Bibliography of the method. —A. W. M. Ellis and A. E. Clark-Kennedy, L. ii./21,894.

Many cases are well treated by Quinidine—others not.—B.M.J.E. ii./21,13.

Dose of 2 to 3 Gm. *p.d.* One patient died.—J. Hay, B.M.J. i./22,564.

Rhythm restored. Commence with moderately large dose—1·25 to 1·5 Gm. *p.d.* for 3 or 4 days. If beat becomes regular 1 Gm. *p.d.* for one or two weeks, then Digitalis and Quinidine alternately for 4 or 5 days.—B.M.J.E. ii./22,1.

Results with Quinidine were not encouraging in a few cases.—W. T. Richie, B.M.J. i./22,801.

Normal rhythm restored in a number of cases.—J. Hay and others, B.M.J. ii./22,1079. Sometimes without the patient being conscious of it. Small doses should be given.—B.M.J.E. ii./22,37.74.

In paroxysmal auricular fibrillation Quinidine Sulphate is indicated. In paroxysmal tachycardia it has little or no effect. In auricular flutter likely to prove of value. In a small proportion of cases with established auricular fibrillation Quinidine restores rhythm.—J. Parkinson and J. W. McK. Nicholl, L. ii. /22,1267.

Successful in use but not suited when there are extensive structural changes in the heart, especially if response to Digitalis is not good.—F. R. Fraser, B.M.J. i./23,507.

Small doses used : in no cases where large doses (48 or even 60 grains a day) were used were there any serious symptoms. The dosage of Frey—six grains is given the first day, two doses the second, three the third and so on till a maximum of 10 doses may be reached. This large number is, however, rarely necessary, as the majority of cases are restored on the second, third or fourth day. The dose is repeated every two hours starting at 5 a.m. Pulse recorded hourly.—J. G. Emmanuel, L. i./23,1050.

Successful circulatory efficiency induced in 50% of cases unaffected by usual therapeutic measures. 2 Gm. daily may be given without serious toxic symptoms.—C. S. Burwell and F. R. Dieuaide per Jl. Trop. Med., June 15/23, 223.

In over 50% of cases Quinidine restores the rhythm temporarily, but only in a much smaller number is the action permanent. When fibrillation is due to abnormal rhythm, Quinidine therapy may be highly satisfactory, but when the myocardium is severely and permanently damaged control of the ventricular rate by Digitalis is of more benefit than restoration of normal rhythm. To the patient fully Digitalised (by massive oral doses) 3 grains of Quinidine are given, followed, if no idiosyncrasy after 12 hours, by 6 grains every 3 hours for 5 doses. When necessary, the procedure is repeated on two following days. If the normal mechanism is not then restored further treatment is not likely to give a permanent result. Quinidine tends to increase the ventricular rate, but Digitalis may be given simultaneously to counteract this.—J. C. Bramwell, L. i./25,1043.

From a study of 49 cases of auricular fibrillation, the use of Quinidine justifiable in selected cases, the most important contraindication being high grades of myocardial damage. The danger of embolism is emphasized.—Can. Med. Assn. Jl., per Jl. A.M.A., ii./25,1091.

Restoration of normal rhythm in 79% of 52 cases treated.—H. H. Riecker, Am. Jl. Med. Sci., per Jl. A.M.A., ii./25,1159.

In heart affections in old persons predisposed to polyuria, Quinidine was found to be diuretic.—L. ii./26,924.

The treatment is difficult and is best undertaken with electrocardiographic control, as toxic effects on the heart are fairly frequent. A dose of 6 grains every 2 hours for a maximum of 5 doses, or until normal rhythm is re-established, then 1 grain three times a day for 6 to 12 weeks, is suggested, first reducing the pulse frequency to between 80 and 100 while at rest in bed.—G. J. Langley, B.M.J., i./27,1043.

Quinidine Sulphate Slipules and Tablets. 5 grains (**0·3 Gm.**) and 6 grains (**0·4 Gm.**) are made.

Elixir Quinidine. *Martindale.*

Contains 10 grains (**0·6 Gm.**) per ½ ounce (**15 Cc.**) dose (*cf.* also **Elixir Quinidine-Cinchonidine**).

Quinidinæ Sulphas Acidus. $C_{20}H_{24}N_2O_2.H_2SO_4+4H_2O=494·352$.

Colourless crystals, *soluble* 1 in 8 in water.

Quinidinæ Hydrochloridum. $C_{20}H_{24}N_2O_2.HCl+H_2O=378·689$.

Colourless silky crystals, soluble 1 in 60 in water (according to our experiments).

Quinidinæ Hydrochloridum Acidum. $C_{20}H_{24}N_2O_2.2HCl+H_2O =415·154$.

Colourless crystals, soluble 1 in 4 in water.

Sterules Quinidine Acid Hydrochloride.

5 grains (**0·3 Gm.**) in 75 minims (**5 Cc.**), also 10 grains (**0·6 Gm.**) in 150 minims (**10 Cc.**), for *intravenous* use, and 5 grains (**0·3 Gm.**) in 30 minims (**2 Cc.**) for *intramuscular* injection.

Quinidine compounds have been given intravenously in heart affections. This compound, by reason of its solubility, is suggested for intramuscular injection both in malaria and heart affections.

Quinidinæ Periodidum. $C_{20}H_{24}O_2N_2.2I=578\cdot072$.

Dose.—1½ to 3 grains (0·1 to 0·2 Gm.), increased if necessary.

When made by the interaction of Quinidine and Iodine in suitable solvent (*cf.* Alkaloidal Periodides) this compound is obtained as an orange powder containing 56·1% Quinidine, according to investigations in the author's laboratories (1923).

Pharmacology:—
This Periodide is largely split up by Physiological Acid (39% of the Periodide being liberated), while a further 12·7% (of the Periodide) is rendered free by subsequent treatment with Physiological Alkali.

1½ grains produced no noticeable effect. A 3 grain dose, however, caused free perspiration 4 to 5 hours after taking, together with feeling of cold.

Soluble in Chloroform, slightly soluble in Alcohol, almost insoluble in Ether, insoluble in water.

Uses.—This form of Quinidine may be of use for the treatment of auricular fibrillation of the heart, and it is well worthy of trial in benign tertian malarial infection, in comparison with the 'ordinary' Quinidine and Cinchonidine preparations.

In the steadying of rapid heart in hyperthyroidism used with great effect.—F. S. A.

Dispensing Note. To be given alone, in cachet or 'slipule,' preferably after food.

Cinchonidina. $C_{19}H_{22}N_2O=294\cdot192$.

Usually, in commerce, in small colourless leaflets, with M.pt. 202·5° C. *Soluble* about 1 in 4000 of water, and about 1 in 20 of Alcohol. It does not give the Thalleioquin reaction, and its solution in Sulphuric Acid is not fluorescent.

Cinchonidinæ Sulphas.—$(C_{19}H_{22}N_2O)_2H_2SO_4,\ 3H_2O = 740\cdot512$. (From alcohol crystallises with $2H_2O$.). *Dose.*—1 to 10 grains. In silky white needles from mother liquor of Quinine Sulphate. *Soluble* 1 in 60 of Alcohol, 1 in 100 of water (more so with a little acid).

Uses.—Therapeutically, in malaria, this has properties on a par with Quinidine. It has been used in other forms of fever, and in neuralgia, and otherwise as Quinine.

Slipules and Tablets 5 grains each (0·3 Gm.) are made of this salt.

Elixir Cinchonidine. *Martindale.* Contains 10 grains (0·6 Gm.) per ½ ounce (15 Cc.) dose.

Elixir Quinidine-Cinchonidine. *Martindale.* Contains 5 grains of each per ½ ounce dose.

Cinchonidinæ Hydrochloridum. $C_{19}H_{22}N_2O.HCl+H_2O = 348\cdot673$.

Dose.—1 to 10 grains (0·06 to 0·6 Gm.).

Colourless crystals, soluble 1 in 30 in water.

Cinchonidinæ Hydrochloridum Acidum. $C_{19}H_{22}N_2O.2HCl + H_2O=385\cdot138$. *Dose.*—1 to 10 grains (0·06 to 0·6 Gm.).

Crystals readily soluble in water.

Sterules for *intramuscular* injection, 7½ grains (0·5 Gm.) in 23 minims (1·5 Cc.).

Cinchonidinæ Periodidum. $C_{19}H_{22}N_2O.4I=801\cdot920$.

Dose.—1½ to 3 grains (0·1 to 0·2 Gm.) increased.

When prepared by the interaction of Cinchonidine Base and Iodine in a suitable solvent (*cf.* Alkaloidal Periodides) this compound is obtained as a brownish-red powder, containing 36·7% Cinchonidine.

Pharmacology :—

According to our experiments it is not markedly split up either by Physiological Acid or subsequent treatment with Physiological Alkali, differing in this respect from both Quinine and Quinidine Periodide. It has been prepared in the writer's laboratories (1923).

1½ grains gave no noticeable effect in a normal. A 3 grain dose, however, caused free perspiration 4 to 5 hours after taking, together with feeling of cold.

Solubility.—Slightly soluble in Chloroform ; almost insoluble in Alcohol and Ether. Insoluble in water.

Incompatible with alkalis, salts of metals and as alkaloids.

Uses.—The body may have a field of utility (*e.g.* in malarial infection) especially in cases where other 'Bark' compounds have been found ineffective or badly tolerated. The content of Iodine (63·3%) renders it suitable for administration in conditions where Iodine is efficacious. It may prove of service in influenza.

Dispensing Note. It is preferably given, finely powdered, alone in cachet or 'slipule' (No. 1) after meals.

Cinchonidinæ Salicylas. $C_{19}H_{22}N_2O.C_6H_4OH.COOH$ = 432·24. Is useful as a tonic and antiperiodic in neuralgia, rheumatism, sciatica, &c., 5 grains every 2 hours in Slipules (No. 00) or cachets.

Cinchonina. $C_{19}H_{22}N_2O$ = 294·192.

Dose.—1 to 10 grains.

Cinchonine salts are the cheapest of the alkaloidal salts of Cinchona. Their nauseous bitter taste is objectionable, though as prophylactics some have thought them superior to quinine.

Idiosyncrasy to Quinine. A lady had had 30 grains of the Bihydrochloride intramuscularly daily for three days, and subsequently 45 grains daily *per os*. This produced dermatitis. She could, however, take Cinchonine base, 16 grains a day.—W. Fletcher and E. A. O. Travers, B.M.J. i./23,629.

Cinchoninæ Hydrochloridum. $C_{19}H_{22}N_2O.HCl,2H_2O$ = 366·689.

Dose.—1 to 10 grains or more.

In white acicular crystals, soluble 1 in 30 of water and 1 in 2 of alcohol 85%. (Commercial samples we find vary).

Cinchonine Acid Hydrochloride. $C_{19}H_{22}N_2O.2HCl$ = 367·122.

Solution 1 in 2 by intramuscular injection—dose 7½, 10 or 15 grains—or the Acid Hydrobromide in malaria equal to or better than quinine.—Sir L. Rogers, B.M.J. ii./18,459.

Cinchoninæ Sulphas. $(C_{19}H_{22}N_2O)_2H_2SO_4 2H_2O$ = 722·496.

Dose.—1 to 10 grains or more.

In hard, colourless, short rhombic prisms with a vitreous lustre. Soluble 1 in 70 cold water, 1 in 10 alcohol 90%. Dilute solution in Dilute Sulphuric Acid should not be markedly fluorescent (absence of Quinine and Quinidine).

Cinchoninæ Sulphocarbolas. $C_{19}H_{22}.N_2O.C_6H_4.SO_2H.OH$ (?) = 468·304. In reddish white needles. Antiseptic febrifuge.

An examination of the polarimetric rotations of concentrated solutions of acid salts of the Cinchona alkaloids showed that when heated at 126° C. for 2 hours decomposition took place rapidly in the Bisulphate of Quinine, Quinidine, Cinchonidine and Cinchonine. The *Bi-hydrochlorides*, however, of Quinine and Quinidine were unchanged and of Cinchonidine and Cinchonine only very slightly decomposed at the same temperature. The acid sulphates were completely altered by 4 hours heating at 141° C., whereas the corresponding hydrochlorides were effected to the extent of 0·4% in the case of Quinine, ranging to 7·7% with the Cinchonine.

Doubt is expressed as to the toxicity of Quinicine and Cinchonicine.—B. F Howard and O. Chick, B.P. Conf. 1923 ; P.J. ii./23,92.

Quinetum. This name has been applied variously in the past. It should be used for the mixture of *amorphous* bases of Cinchona Bark, the crystallisable alkaloids having been previously removed.

QUININA.

Fr. Cx., P. Hung., P. Svec., U.S. X.

$C_{19}H_{20}N_2O.CH_3.OH + 3H_2O = 378{\cdot}256$ **Ph. Ned. V.** is anhydrous.

Dose.—1 to 4 grains (0·06 to 0·25 Gm.) or more (if anhydrous, 3 parts equal approximately 4 of sulphate). *Antimalarial Dose* (*U.S.*) 15 *grains daily.*

Quinine base can be produced with 1, 2 or 3 H_2O.

It forms additive compounds with Hydrocarbons, *e.g.*, 1 molecule Quinine +1 molecule C_6H_6. A body has also been made consisting of 2 molecules Quinine, 1 molecule Hydrocarbon and $2H_2O$. Combinations with Amyl Acetate, Ethyl Acetate, Toluol, Dimethylaniline and Nitrobenzol also with Essential Oils, *e.g.*, Lavender, Pine, Rosemary, also with Terebene, Terpineol have been made.—Schaefer, 8th Int. Cong. App. Chem., N.Y., Sept., 1912.

Soluble.—Slightly in water (1 in 2,600), 1 in 40 of ether and about 1 in 1 of alcohol 90%, also in dilute acids, 1 in 3 of chloroform, and in aqueous ammonia. Antipyrin increases its solubility in water. Its solution in diluted sulphuric acid is fluorescent, lævogyrate, and gives, with chlorine water and ammonia afterwards added, a green colour due to **Thalleioquin.**

Uses.—Quinine is the most valued Cinchona alkaloid, a white powder. It is not so bitter as its salts, hence may well replace them.

Malaria in children is well treated with it. It is readily absorbed by the acid of the stomach, and quite as effective as the salts. It can be detected in the urine 10 minutes after taking. In wasting diseases, *e.g.*, tuberculosis. Quinine retards protein breakdown and may be prescribed with advantage.

See also Quinine Hydrochloride, Sulphate, etc., and p. 743, *for malaria treatment.*

Quinine as an economic weapon.—Amongst all the Allies the call for Quinine in the great war was almost desperate—especially in the Italian Forces—in fact the allied cause was in jeopardy. It is scarcely too much to admit that the future destiny of the civilised world rested with the Dutch. The keynote of the situation was the Java Cinchona plantation. The famous War Agreement of September 3rd, 1918, saved the situation—the Associated Countries secured practically the whole year's production of Java Quinine on reasonable terms.—'X.F.O.' C.D. '19,1065.

While the production of ***synthetic Quinine*** would undoubtedly be a triumph for organic chemistry, the more economic method of production will lie in the proper utilisation of the Cinchona plant. A plea for an experimenta Station.—Prof. Greenish, L. ii./22,236.

Production.—Dutch data. The present production it appears is in excess of commercial demands, though millions are suffering from malaria owing to lack of Quinine.—B.M.J., i./25,700.

The total present world-production of Quinine is 600,000 Kg. per annum, made in 14 factories, and it is doubtful whether this is sufficient for the world's needs. Question as to possibility of increasing supply should be seriously considered.—Health Committee, League of Nations, L. i./24,720.

Our Dominions are unable to produce all the Cinchona Bark and its alkaloids required.—Sir D. Prain, P.J., ii./27,9.

Extraction of Quinine and Strychnine from solutions of varying Hydrogen-ion concentration.—N. Evers, P.J. ii./22,90.

Fatty compounds of Cinchona alkaloids used to destroy and keep clothes free from moths, usually by soaking or spraying with a Petroleum or Carbon Tetrachloride solution. Used in dry-cleaning plants in U.S.—P.J., ii./27,580.

Acidum Quinicum. *Syn.* **Kinic Acid.**
$C_6H_7.(OH)_4COOH+H_2O=210{\cdot}112$.
Dose.—4 to 8 grains (0·25 to 0·5 Gm.).

An acid contained in Cinchona, principally combined with the alkaloids and with calcium, forms white crystalline masses, soluble in water about 5 in 6, and in alcohol 90% 1 in 35. It is decomposed into hippuric acid in the system. This and **Lithium Quinate** in similar dose are used in gout and rheumatism.

℗1**Quininæ Arsenas.** $2(C_{20}H_{24}N_2O_2).\ H_3AsO_4+8H_2O = 934{\cdot}528$.
Dose.—$\frac{1}{8}$ to $\frac{1}{2}$ grain (0·008 to 0·03 Gm.).

Small white crystals, sparingly soluble in water. It is an anti-periodic, given in chronic malarial fevers. Contains about 15·2% of arsenic acid, and 69·4% of Quinine.

℗1**Quininæ Cacodylas.** $C_{20}H_{24}N_2O_2.(CH_3)_2AsO_2H=462{\cdot}224$.
Dose.—*Per os* and hypodermically, $1\frac{1}{2}$ to 4 grains (0·1 to 0·25 Gm.).

This salt has been suggested for intravenous use in malaria, $7\frac{1}{2}$ grains (0·5 Gm.) in 20 Cc. It has approximately the same toxicity as Quinine Acid Hydrochloride and Acid Hydrobromide.

Quininæ Camphoras.
$2(C_{20}H_{24}N_2O_2).C_8H_{14}(COOH)_2=848{\cdot}544$. *Dose.*—1 to 10 grains. An insoluble powder. 76·4% Quinine.

Quininæ Citras.
$2(C_{20}H_{24}N_2O_2).C_3H_4.OH(COOH)_3+7H_2O = 966{\cdot}592$.
Dose.—1 to 5 grains (0·06 to 0·3 Gm.).

Soluble 1 in 900, has, therefore, little taste. Given suspended in mixture. Contains 67·1% Quinine.

Effervescent Quinine Citrate. *Dose.*—1 drachm. Contains 1 grain.

Ferri et Quininæ Citras (*B.P.* '14).

Dose.—5 to 10 grains (0·3 to 0·6 Gm.) in solution, or in pills with simple syrup or mucilage of acacia (not in excess, as, unless made very hard, they lose shape). Alcohol 60% with Glycerin 5% is also a suitable excipient. Contains about 15% of quinine, in greenish deliquescent scales. It has an agreeable bitter, chalybeate taste. Largely used as a general tonic.

Incompatible with Tannin and Alkalis, also with Phosphoric Acid (Ferric Phosphate may be thrown out), unless considerably diluted prior to mixing.

Flavoring.—Glyl Vanillæ, **Glyl Menthæ Piperitæ** (bold dose), Syrupus Zingiberis.

Effervescent Citrate of Iron and Quinine.
Dose.—1 drachm (4 Gm.) = 3 grains of the salt.

Tablets of Iron and Quinine Citrate 3 grains.

Syrupus Ferri et Quininæ Citratis.
Dose.—1 drachm (4 Cc.). 1 in 20 of Orange Syrup.

℗1**Ferri, Quininæ et Strychninæ Citras** (*q.v.*) contains 1% of Strychnine.

Ⓟ**Sirop Neurotonique.**
Dose.—2 to 3 drachms (8 to 12 Cc.) in a little water after meals. Iron and Quinine Citrate 0·50, Strychnine Nitrate 0·01, Liquid

Extract of Kola 5·0, Sodium Glycerophosphate 5·0. Dissolve with slight heat in Orange Syrup, *q.s.*, to 100.

Quininæ Formas Acidus ("Neutral" in France).

$C_{20}H_{24}N_2O_2.(H.COOH)_2=416·24$.

Dose.—1 to 5 grains (0·06 to 0·3 Gm.).

Long white needles containing 77·9% Quinine, M.Pt. 95° C.

Quininæ Formas Neutralis ("Basic" in France). *Syn.* CHINOFORM, QUINOFORM. $C_{20}H_{24}N_2O_2.HCOOH=370·224$.

Dose.—1 to 5 grains (0·06 to 0·3 Gm.). Subcutaneously 1 to 3 grains. (Stated not to be painful.)

Prepared by using a very small quantity of water, in which the Quinine is placed and the acid added. Crystals melting at 132°; lævorotatory. Contains 87·5% Quinine. A general tonic. Suitable for hypodermic use.

Solubility.—Varies according to conditions of manufacture. Some commercial samples we found were only soluble in 600 of water and 110 of Alcohol. We found that a 1 in 20 solution can be made extemporaneously by dissolving 1 gram of the base in 19 Cc. of water containing 0·125 gram of Formic Acid, but we could not make the salt more soluble than 1 in 55 of water and 1 in 7 of Alcohol, there being dissociation.

Sterules, Hypodermic, contain ⅓ grain (0·02 Gm). and ¾ grain (0·05 Gm.).

Guttæ 1 in 50 have been employed satisfactorily in asthenopia.

Quininæ Hydrobromidum, U.S. X., FR. Cx.—'Basic' Quinine Hydrobromide. P. HELV. **Quinine Bromide.**

$C_{20}H_{24}N_2O_2.HBr+H_2O=423·148$.

Dose.—1 to 5 grains (0·06 to 0·3 Gm.) or more. *Antimalarial Dose* (U.S.)—15 grains daily.

White acicular crystals, soluble 1 in water 40. (P. Helv. 60.)

Contains 76·6% of Quinine. Quinine is given with an excess of hydrobromic acid to lessen the cinchonism sometimes caused by large doses. Is valuable in acute rheumatism. In malaria for oral administration, hypodermically or intravenously.

EXOPHTHALMIC GOITRE has been well treated by 5 grain Capsules given to the limit of tolerance (3 or 4 Capsules *p.d.*)—for months or even years. In many cases the thyroids diminish in size—the exophthalmos seems to be the last to disappear—this may take years. The Quinine probably acts on the sympathetic system.—Boston Med. and Surg. Jl. Sept. '15,10, *per* Pres., Dec. '10,215.

In 2½ grain doses thrice daily one of the best treatments.—J. B. Alexander, Clin. Jl., Aug. 15/23,394. See also Quinine Sulphate.

Tablets contain 3 and 5 grains, also 3 grains, **with Phenacetin,** 5 grains. **Hypodermic Tablets** of the Salt contain ½ grain.

Tropical abscess has been treated by aspirating and injecting into the cavity 1% solution of this Salt.

Quininæ Hydrobromidum Acidum. (FR. Cx.—'Neutral.')

$C_{20}H_{24}N_2O_2.2HBr+3H_2O=540·114$.

Dose.—½ to 2 grains (0·03 to 0·12 Gm.) hypodermically.

In yellowish rectangular prismatic crystals, or in powder. Contain 60% of Quinine.

Soluble 1 in 7 of water, and is well adapted for hypodermic injection. It is entirely unirritating. The additional hydrobromic radical tends to prevent quinism.

Sterules, Hypodermic, contain 2 grains (0·12 Gm.) each.

Injectio Quininæ Hydrobromidi Acidi Hypodermica. 2 grains in 1 Cc. *Dose.*—½ to 1 Cc.

Used where quinine cannot be borne by the stomach. In malarial fever and subsequent rheumatism.

Quininæ Hydrochloridum. *B.P.* '14. Fr. Cx. 'Basic,' U.S. X., P. Helv., P. Jap., P. Hung. Ph. Ned. V., P.G. VI. *Syn.* Quinine Hydrochlorate.

$C_{20}H_{24}N_2O_2.HCl+2H_2O=396·705$.

Dose.—1 to 10 grains (0·06 to 0·6 Gm.). *Slipule* No.0 holds 5 grains. The crystals contain 81·7% base against 73½% in the sulphate.

Soluble 1 in 40 of water, 1 in 3 of 90% alcohol.

Two salts with a common ion lessen each other's solubility. The less solubility in Ringer's Solution (1 in 110) is due to its slight alkalinity, also to the fact that it contains a slightly greater number of Chlorine ions.—J. H. Crawford, B.M.J. i./22,8/4.

Quinine Hydrochloride 2 with Antipyrin 1 will dissolve in 4 of water.

Uses and References—

It is sometimes better tolerated than the Sulphate. Subcutaneous or intravenous injections useful where not tolerated by the mouth. **Giemsa's Injection** contains Quinine Hydrochloride 10 Gm. Water 18 Cc., Ethyl-Urethane 5 Gm. The volume of product is 30 Cc., so that 0·5 Gm. is contained in 1·5 Cc. of solution for injection. *See also* Quinine Urethane.

As a fever prophylactic quinine hydrochloride 3 grains with phenacetin 5 grains is largely used in Portugal.—Ph. Notes.

For the paroxysmal headache or neuralgia so common after malaria the following mixture is recommended:—Quinine Hydrochloride 3 grains, Tincture of Cimicifuga 5 minims, Citrate of Caffeine 2 grains, Spirit of Chloroform 10 minims, Compound Infusion of Orange to 1 ounce, twice daily.

For use in Malaria, see p. 743, *and for toxic effects, p.* 749.

In acute tonsillitis, Quinine internally and as mouth-wash useful; also with Dilute Nitric Acid in cachectic cases of vesicular stomatitis.

Wounds treated by Quinine Hydrochloride 1% solution as wet dressing, also 1/10% with 1/10% of Hydrochloric Acid as continuous drip. Active in ridding heavily contaminated wounds of the gas bacillus. Quinine is especially effectual in a menstruum of pus.—K. Taylor, B.M.J. ii./15,923; L. i./17,294.

Anal fissure treated by Quinine Hydrochloride packing (5 grains) and Quinine suppository. Granulation good.—H. G Leyton, B.M.J. i./18,314.

Mistura Quininæ cum Ferro.

Dose.—½ ounce thrice daily in water 30 minutes after food.

Quinine Hydrochloride 30 grains, Tincture of Ferric Chloride ½ ounce, Glycerin 1 ounce, Water to 8 ounces.

Bad cases of secondary syphillis do well on this.

Lotio Quininæ Hydrochloridi R.O.H. 1%. For corneal ulcers *cf.* p. 736.

Tablets, 1, 2, 3, 4, and 5 grains.

Pessus Quininæ (flat shape).—3 to 5 grains of Quinine Hydrochloride in Theobroma Oil basis. A valuable remedy for leucorrhœa.

A solution of Quinine arrests the movement of spermatozoa.

Contraceptives.

The following is a resumé of the chemical substances and preparations of them used for the purpose of contraception, with statements as to their relative values :—

Lactic Acid.—It is well known that the secretion of the vagina is acid, owing to the presence of 0·9% Lactic Acid, which is secreted by Döderlein's Bacillus. In the act of coitus, alkaline secretion is passed by the mucous membrane for the purpose of neutralising the acid. It has been suggested therefore to employ 1% of Lactic Acid to overcome this alkalinity.

Lactic Acid Pessaries are prepared with Theobroma basis weighing 20 grains, or a larger size 8 Gm., for vaginal use, containing 2% of Lactic Acid.

Lactic Acid Jelly of a non-greasy type contains also 1% Lactic Acid, together with a small proportion of Boric Acid and a minute quantity of Thymol as preservative.

Contraceptalene is a preparation of this kind.

Patentex, a contraceptive jelly, was found to be a Glycerole of Starch preparation, containing 20% Boric Acid, and

Metag, described as an improvement on Patentex, was found to consist solely of Tragacanth Mucilage and a trace of Boric Acid.

Quinine Suppositories are well known and are supplied as follows :—3 or 5 grains of Quinine Hydrochloride in either Theobroma or Gelatin mass

Quinine Pessaries were found to fail in 71% of cases.

Chinosol has been used, but is believed by some to be injurious. The following statements have been made :—

As a few women apparently absorb sufficient Quinine to cause sleeplessness and slight digestive disturbances, a suppository of Chinosol in Cocoa-butter is recommended by The C.B.C. Med. Research Committee.—L. ii./27,42.

Chinosol in any medium is not tolerated by a considerable number of women. Its use frequently produces inflammation and discharge, whilst sterility is stated in one instance to have been caused by it. A Lactic Acid Pessary in conjunction with an occlusive pessary found most efficient.—Norman Haire, L. ii./27,143. *See also ibid.* L. ii./27,256,308 and 360.

Effervescing Tablets.—These are employed to some extent abroad but the evidence is that they are exceedingly uncertain for the purpose, owing to the fact that they do not readily dissolve, and hence fail to function.

✶Speton (T.M. 462940) **Tablets** are an example of this type.

Douches.—The following are recommended :—

(*a*) 1% Lactic Acid solution ; (*b*) Normal Saline ; (*c*) Vinegar, 1 drachm to the pint ; (*d*) Potassium Permanganate 1 in 4,000. Douching failed to prevent conception in 74% of cases.

See also Contraceptive Section, Report of the 5th International Neo-Malthusian and Birth Control Conference, 1922 ; Pr. July '23,80. Also 'The Comparative Value of Current Contraceptive Methods' read at Internat. Kongress für Sexualforschung, Berlin, Sept. 16, '26.

Sterilisation of men and women described, also Dutch ring pessary—said to give little inconvenience.—Birth Control Conference, L. ii./22,195.

Birth Control and the State. C. P. Blacker says no really satisfactory contraceptive exists. Chemical preparations give no security.—L. i./26,766.

Modern methods of birth control are causing an increase of involutional insanity among women.—L. i./26,660.

Schereschewsky's 40% Quinine Ointment holds a high position for disinfection against venereal disease in Germany. 1 in 1000 Perchloride is reliable.—L. i./22,292.

Tinctura Quininæ (*B.P.* '14). *Dose.*—½ to 1 drachm (2 to 4 Cc.).

Quinine Hydrochloride 1, Tincture of Fresh Orange 50. A very agreeable form of taking small doses of Quinine. Hydrochloride of Quinine is used as first suggested by W. Whitfield.

Vinum Quininæ (*B.P.* '14). *Dose.*—½ to 1 ounce (**15 to 30 Cc.**).

Contains one grain of Quinine Hydrochloride dissolved in one ounce of Orange Wine.

The Board of Customs and Excise allow its sale without Excise licence if:—(a) It is prepared in accordance with the B.P. '14 directions. (b) That sales are made only by duly qualified chemists and druggists; and (c) It is labelled to show that it is to be used as a medicine. The word "Dose" should appear on the label in bold type. This should not exceed the B.P. '14 dose—viz., ½ to 1 oz.—but the Board do not object to the use instead of the words "one or two tablespoonsful," or "half a wineglassful."

Quininæ Hydrochloridum Acidum. In Fr. Cx. is termed 'Neutral'

Quinine Hydrochloride. $C_{20}H_{24}N_2O_2.2HCl=397{\cdot}138$.

N.B.—Fr. Cx. adopts the salt+2½ H_2O. Crystallised from alcohol the Salt contains alcohol and water of crystallisation. Left exposed to the air this loses its alcohol and the Salt changes to one with 2½ molecules of water, becoming at the same time opaque.

Dose.—1 to 10 grains (**0·06 to 0·6 Gm.**), *Antimalarial dose* (*U.S.*) 15 *grains daily.* ½ to 2 grains (**0·03 to 0·12 Gm.**) hypodermically.

In white or yellowish white crystalline crusts. *B.P.* '14 states in amorphous powder. Is claimed to be soluble 1 in 1 of water. Contains 81·6% of quinine.

Uses.—This is the most suitable salt for injections which have to be sterilised (*cf.* Bi-Sulphate), and it is considered the best salt for intravenous use in malaria, septicæmia, etc. The hydrochloric radical is not as irritating as the sulphuric to the stomach.

Intravenous Injection of Quinine Acid Hydrochloride.

Dose.—An average dose may be considered as from 4 to 15 grains (**0·25 to 1 Gm.**) though Sir L. Rogers, B.M.J. ii./17,381, states that 5 to 7½ grains commonly produces cinchonism.

Dilution.—Some use an exceedingly dilute solution (*e.g.* as low as 1 in 300). Others advise even a 10% solution. Personally we recommend a medium of 1 in 40 or 1 in 50. Newton Pitt uses 4 grains (**0·25 Gm.**) in 150 minims (**10 Cc.**) *i.e.* 1 in 40. A. G. Phear found 10 grains in 300 minims (**20 Cc.**) saved many lives in Macedonia.

Rate of injection.—This, as with all intravenous procedure, should be slowly performed.

Danger of rapid intravenous injection of Quinine solution in malaria. There may be dangerous fall of blood pressure with concentrated solution. The whole problem turns on the amount of Quinine passing through the heart every second. The amount of Quinine injected into a vein at the bend of the elbow should not be more than 1/120th grain per second or ½ grain a minute. This will mean 10 grains will require 20 minutes. For Quinine Hydrochloride intravenous injection the solution should not exceed strength of 1 in 300—to be given at the rate of 10 Cc. per minute for patients over 15 years of age. Half rate for children under 15. Tables showing effect on systolic, diastolic and pulse pressures after intravenous injections of dilute solutions of Quinine Bihydrochloride.—U. N. Brahmachari, L. ii./22,175, Jl. Trop. Med., July 1/22,209–211

For further details of intravenous use in Malaria, see p. 745.

PNEUMONIA.—Treatment by Quinine Bihydrochloride intravenously (7 grains in 10 Cc.)—R. Kharegab, L. ii./25,626.

SEPTICÆMIA.—Five grains (0·3 Gm.) in 10 Cc. has been employed. See B. Ratten, B.M.J. ii./27,39.

PUERPERAL SEPSIS.—One or two injections of 10 grains produced good results.—P. Liston, B.M.J., ii./27,959.

As local anæsthetic ½ to 1% solution (for mucous membrane a 10% solution may be applied with cotton wool) is injected into the tissue. A coagulable exudation forms, beginning a few minutes after the injection and becoming complete after 24 to 48 hours. If incision is made at once after injection, the anæsthesia is short, and the wound heals as if no local anæsthetic had been used. When primary union is not possible, and more prolonged anæsthesia is wished for, the tissues should not be incised until the infiltration has formed, *e.g.* after half an hour or more; when this infiltration has occurred the anæsthesia may last several days.—L. ii./10,840.

Quinine and all its derivatives are general protoplasmic poisons and in proportion as they exert this action they act as local anæsthetics.—W. E. Dixon and Premankur De, Jl. Ph. & Exp. Ther., Oct. '27,407.

TONSILLECTOMY.—As a local anæsthetic Quinine Hydrochloride ¾ grain in 2 drachms of water superior to 0·2% Cocaine (5 Cc.). A small amount of 20% Cocaine first applied.—E. J. Brown, Jl. A.M.A., July 28, '23,321.

CANCER.—Quinine often of value for relief of pain. Injection intramuscularly of 20—30 Cc. Quinine Bihydrochloride solution 10% every other day, and 1 Gm. *per os* on alternate days.—Per Chininum, 226.

Quinine Bihydrochloride (7½ grains intramuscularly) is a powerful inducer of leucocytosis, but it appears to have no advantage over Novarsenobenzol or Mercury, and injections are painful.—G. R. S. Thomas, L. i./25,1292.

LIVER ABSCESS.—After exploratory aspiration repeated irrigation of an abscess cavity with Quinine Bihydrochloride 3 to 5 grains per ounce may render subsequent operation unnecessary.

Soluté de Quinine pour injection hypodermique.—FR. CX.

Quinine Acid Hydrochloride 3 Gm., Antipyrin 2 Gm., Water to 10 Cc. Special instructions as to sterilisation are provided, *q.v.*

Isotonic Quinine Acid Hydrochloride Solution contains 0·565 Gm. in 10 Cc.—P.J. i./12,357.

Sterules, Hypodermic, contain 2 grains (**0·12 Gm.**) also 3 grains (**0·2 Gm.**), 5 grains (**0·3 Gm.**) also 15 grains (**1 Gm.**) in 2 Cc. for ***Malaria*** also 4 grains (**0·25 Gm.**) in 10 Cc. and 10 grains (**0·6 Gm.**) in 20 Cc. for ***intravenous uses.***

Also **Sterules, Hypodermic of Quinine Acid Hydrochloride** 5. grains (**0·3 Gm.**) with **Antipyrin** 3 grains (**0·2 Gm.**).

Tablets 1, and 5 grains. **Tablets, Hypodermic,** 1, 2, and 3 grains.

Quininæ Hydrochloro-Carbamidum.—*Syn.* UREA-QUININE. U.S. X.

(A variety is ✱**Nikalgin** (T.M. 366289.)—B.M.J. i./18,254.).

$C_{20}H_{24}N_2.O_2.HCl\ CO\ (NH_2)_2,HCl+5H_2O=547{\cdot}266.$

Dose.—5 to 15 grains (**0·3 to 1 Gm.**).

In small prisms, soluble 1 in about 1 of water. Contains 59·2% Quinine. Used hypodermically in malaria 2 to 5 grains and in cholera, in as large as 12 to 15-grain doses. The latter is U.S. X. hypodermically (one dose daily) as average.

As local anæsthetic analgesia persists for 4 to 6 hours, even to several days. Used in America for malaria in which marked anæsthesia was noticed at the site of injection, hence its trial as a Cocaine substitute. 3 to 5 Cc. hypodermically of 1% solution (up to 3% is harmless). In 10 to 30 minutes produces anæsthesia; at the same time it acts as a hæmostatic. Healing of wounds is, however, delayed owing to thickening of the edges due to fibrinous exudation. In operations on hæmorrhoids 2% solution has caused sloughing.

J. E. D. Jones writes us 5 Cc. of 1% solution injected to ease pain in a case of spinal injury. Anæsthesia was prompt and profound and lasted 2 days without ill effect afterwards—far superior to Cocaine and Morphine.

Painless operations. Results with Quinine Urea Hydrochloride and with Novocain.—P. Lockhart-Mummery, Pr., Feb. 1920.

In tonsilitis and in tuberculosis of the larynx 10% solution or less is suitable,—even 20 or 50% may be used. Apply by spray, sponge, brush, etc. A teaspoonful or so of solution may be taken in the mouth and used to bathe the tonsils by swaying the head from side to side.

HÆMORRHOIDS injected with Quinine Urea Hydrochloride 5 to 10% solution. Enemata of Sodium Bicarbonate used for washing out the bowel instead of soap in U.S.A.—non-irritating.—L. J. Hirschman, B.M.J. ii./21,155.

PRURITUS ANI, VULVÆ, AND SCROTI, well treated as follows: render part clean, apply Mercurochrome solution as antiseptic, inject small area with not more than 10 Cc. 1% Procain, inject ¼ grain Morphine hypodermically, infiltrate remainder of diseased skin with Quinine and Urea Hydrochloride solution 0·25 to 0·5% (as much as 200—300 Cc. may be used). Itching arrested, excoriations healed and skin becomes normal in few days.—Jl. A.M.A., Sept. 6, '24,766.

EXOPHTHALMIC GOITRE and thyroid enlargement treated by injections of 4—8 Cc. of a 4% solution of Quinine Urea Hydrochloride into the thyroid. After a few treatments the goitre becomes smaller and when it is one-third of original size the treatment can be stopped, as the shrinking will continue until no tumour is perceptible. The drug is believed to act through its necrotic action on the parenchyma of the gland.—H. G. Loughran, Med. Jl. Austral., '27,263, per Pres., May, '27,173.

From point of view of acidity no advantage in this salt over hydrochloride. —J. H. Crawford, B.M.J. i./22,874.

Sterules contain 3 and 5 Cc. of 1% solution for subcutaneous use.

Sterules of Urea-Quinine with Eucaine ½ grain each for dental use are prepared.

Suppositories contain 5 grains for use in painful hæmorrhoids.

Ointment (with Lanolin and Soft Paraffin basis) 20%.

Quininæ Hydriodidum. *Syn.* QUININE IODIDE. $C_{20}H_{24}N_2O_2$,HI =452·148. Is in minute pale-primrose coloured, slightly soluble crystals. **Quininæ Hydriodidum Acidum.** *Syn.* QUININÆ IODIDUM ACIDUM. $C_{20}H_{24}N_2O_2 2HI,5H_2O$=670·168. Is in golden crystals, soluble about 1 in 20 of water. Contains 48·4% Quinine. Must be kept from the light. **Quininæ Hypophosphis.** $C_{20}H_{24}N_2O_2.H_3PO_2.2H_2O$=426·295. In crystals or powder. Soluble 1 in 35 in water, or even less if pure.—D. B. Dott, P.J. i./22,64,87. More soluble in alcohol 90%. Contains 76·05% Quinine.

Quininæ Lactas, Quinine Lactate.

$C_{20}H_{24}N_2O_2.CH_3.CHOH.COOH$=414·256.

A granular white powder, soluble 1 in 10 of water; said to be well tolerated. Contains 78·3% of quinine. Suitable for hypodermic injection. For gonorrhœa, 1% solution forms an excellent injection.

Dose of each of the above.—1 to 5 grains (0·06 to 0·3 Gm.) or more.

Quinine-Mannitol Injection.

Suggested Dose.—15 to 30 minims (1 to 2 Cc.) hypodermically, containing 2 to 4 grains of Quinine Base.

A suggested intravenous dose is 1 Cc., diluted to 10 or 20 Cc. just prior to use.

It should be stated that as yet there is only slight clinical information on this injection.

Preparation.

The solution has the following composition: Quinine Base 12 Gm., Boric Acid 8.4 Gm., Mannitol 7.5 Gm., Distilled Water to 100 Cc.

1 Cc. contains 0·12 Gm. (approx. 2 grains) of Quinine Base and 0·084 Gm. (1½ grains) of Boric Acid. It is easily made by rubbing the powders together with about half the required amount of water, then adding, as the alkaloid dissolves, sufficient to produce the necessary volume. Quinine-Mannitol can be sterilised by heating to 100° C., the deposit of alkaloidal base formed redissolving on standing at the ordinary temperature for a few hours. The solution remains clear and unchanged up to a temperature of 60° C. (140° F.), and no crystallisation occurs at as low a temperature as − 6° C. (21·2° F.). On dilution with water the neutral Quinine-Mannitol becomes slightly alkaline, owing to the liberation of Quinine Base by hydrolysis.

Uses.—This new solution of Basic Quinine for injection was designed to replace to some extent the acid solutions at present employed in malaria.

It appears evident that alkaloidal salt solutions on entering the tissues are decomposed by the alkalinity of the blood, and *that free base is liberated before absorption takes place.* Hence it would seem preferable, as described under **Activated Alkaloids**, to use when possible, an alkaloidal base instead of a salt. The necrosis caused by Quinine salts hypodermically is no doubt due to the deposition of Quinine Base at the site of injection. Such Quinine can have no immediate antimalarial or other efficiency, because it is not dispersed through the tissues.

It has been shown experimentally that when Quinine-Mannitol comes in contact with blood a large proportion of the Quinine (larger than in the case of Quinine Acid Hydrochloride) is present in solution in the basic condition, and, therefore, in all probability, is more readily absorbed and is less likely to be deposited.

H. W. Acton and R. N. Chopra, who do not favour the injection of the salts of the Cinchona alkaloids, found that the Hydrochloric Acid radical of a Cinchona alkaloidal salt causes œdema, irritation and pain (Ind. Jl. Med. Res., Oct., '24). The new solution should obviate these effects. A basic preparation would seem of advantage as T. A. Henry and H. C. Brown found that Quinine Base was more active against free-living protozoa than the hydrochlorides, and J. A. Sinton found better results in malaria by the use of alkalies with the Quinine. H. Acton has also recorded the increased activity of the salts towards paramœcium in presence of alkali, and concluded that the Base would be probably more efficient 'if a means could be devised for injecting it in solution in this form.' ⚐ ⚑

***For further details and refs. see a paper by W. H. Martindale,* L. i./26, 455.**

Toxicity.—

Some experiments, kindly conducted by Major H. C. Brown, showed the toxicity to mice intravenously to be practically the same as that of a Quinine Acid Hydrochloride solution of equivalent strength. The lethal dose of the solution, suitably diluted 12 or 24 times, was found to be about 1 Cc. per kilo body-weight (approx. 120 mg. of Quinine per kilo).

A small point, which needs obvious mention, is the possibility of the cumulative effect from the 1½ grains of Boric Acid, if repeated; but this is, perhaps, negligible. [Novocain Borate tablets for making hypodermic injections contain nearly ¾ grain of Boric Acid.] The addition of Mannitol to injections is occasionally referred to and recommended in the literature.

The above comparative results with Quinine Acid Hydrochloride are of value in respect of a toxicity dose of Boric Acid. We have not seen the toxic dose of Boric Acid by injection in any work of reference.

Sterules Quinine-Mannitol.—2 Cc. containing **0·24 Gm.** (4 grains) of Quinine according to the above formula are prepared.

Quininæ Nucleinas. *Dose.*—1 to 5 grains (**0·06 to 0·3 Gm.**).

Yellowish powder containing 60% quinine and 40% nucleinic acid. Insoluble in water. In syphilis has been employed as 5% suspension in Olive Oil. Intramuscular injections of 10 Cc. were used, assisted by intravenous injections of the hydrochloride.

See also Quinine Hydrochloride, and compare Quinine Urethane.

Quininæ Periodidum. $C_{20}H_{24}N_2O_2.3I=705·004$.

Dose.—1½ to 3 grains (**0·1 to 0·2 Gm.**) (in Slipule No. 5).

When made by interaction of Quinine and Iodine in suitable solvent (*cf.* Alkaloidal Periodides) this compound is obtained as a dark-red powder containing 46% of Quinine, according to investigations in the author's laboratory (1923).

This Periodide is almost completely resistant to Physiological Acid, only 1·6% of the Periodide being liberated, while on the other hand a large proportion (9·3% of the Periodide) is liberated in Physiological Alkali.

Soluble slightly in Alcohol, almost insoluble in Chloroform and Ether, insoluble in water.

Uses.—In all forms of fever. It is specially recommended in influenza, the combined effect of Quinine and Iodine in a relatively free condition suggests the compound is veritably a specific combination. In general it is a tonic. In malaria it should be submitted to an extended trial. Many persons do not tolerate the ordinary forms of Quinine. The sulphate may be dissociated with liberation of free Sulphuric Acid, causing irritation. The hydrochloride was supposed to overcome this difficulty, apparently without success, and one frequently reads of Quinine base (Cinchonine base has also been specifically advised) being given to circumvent the difficulty in question. Might be of service in a dysentery associated with malaria. There is no doubt that a compound containing so large a proportion of Quinine, which passes through the stomach without causing discomfort, is worthy of careful investigation.

Dispensing Note.—To be given alone, in cachet or 'slipule,' preferably after meals.

Quininæ Phosphas.

$2[C_{20}H_{24}N_2O_2], H_3PO_4+8H_2O=890·595$.

Dose.—1 to 6 grains (**0·06 to 0·4 Gm.**). Is in acicular crystals like the sulphate, but harder and denser. Contains 72·8% quinine Composition varies with manufacturers. Soluble 1 in 420 of water.

Quininæ Quinas.—$C_{20}H_{24}N_2O_2.C_7H_{12}O_6+2H_2O=552·336$.

Dose.—1 to 10 grains (**0·06 to 0·6 Gm.**).

White crystals soluble in water 1 in 7. Suitable for injection.

Quininæ Salicylas.

$C_{20}H_{24}N_2O_2.C_6H_4(OH)COOH + H_2O = 480·272$.

Dose.—2 to 6 grains (**0·12 to 0·4 Gm.**).

White crystals, sparingly soluble in water, and about 1 in 60 of alcohol 90%.

Incompatible with mineral acids—salicylic acid may crystallise out. Contains 68·8% of quinine. Should be given suspended in water, or in cachets, or pills with syrup of glucose; recommended for diarrhœa and neuralgia, rheumatism and sciatica.

In rheumatic fever virtually inert.—R. Stockman.

Effervescent Quinine Salicylate

Dose.—1 drachm. Contains 3 grains in 1 drachm.

Used in the tropics as a prophylactic to malaria.

Tablets 3 grains (0·2 Gm.). *Dose.*—1 to 2.

Capsules contain 5 grains (0·3 Gm.).

In dengue Quinine Salicylate 5 grains every four hours has proved useful.—Brooke.

Quininæ Acetyl-Salicylas.

$C_{20}H_{24}N_2O_2.CH_3.COOC_6H_4COOH = 504{\cdot}272.$

Dose.—1 to 5 grains (0·06 to 0·3 Gm.).

Useful antipyretic and antiseptic compound. Contains 64·3% Quinine. Melting at 167° C. *Soluble* in Water 33, Alcohol 1 in 40, Chloroform 1 in 10. Immediately decomposed by Acids and Alkalis. Tablets, 3 grains are prepared.

Quinine Acetosalicylsulphate. $(C_{20}H_{24}N_2O_2)_2.H_2SO_4.4C_9H_8O_4.4H_2$ $= 1538{\cdot}816.$

This substance appears to be a definite compound, soluble 1 in 50, *i.e.*, much more soluble than the components, hence should be of use therapeutically.—D. B. Dott, C. & D., Mar. 26, 1921, p. 429.

Quininæ Sulphas, Quinine Sulphate (Termed '**Basic**' **Quinine Sulphate** in Fr. Cx. and F.E.).

$(C_{20}H_{24}N_2O_2)_2.H_2SO_4 + 7H_2O = 872{\cdot}608.$ Fr. Cx., P. Jap., Ph. Ned. V. and P.G. VI., $8H_2O$. *B.P.* '14 $7\frac{1}{2}H_2O$. U.S. X. '7 or 8' H_2O.

This is the principal quinine salt, it contains 73·5% (*B.P.* '14).

Dose.—1 to 5 grains (0·06 to 0·3 Gm.), tonic; 5 to 15 grains (0·3 to 1 Gm.), antiperiodic. Slipule No. 0 holds 5 grains.

White bitter crystals. *Soluble* 1 in 800 of cold water, 1 in about 100 of 90% alcohol, 1 in 40 of glycerin. It is rendered more soluble by the addition of Antipyrin.

Over Dose.—100 grains of Quinine Sulphate taken in one dose in error. Hot infusion of coffee gave great relief and holding hands in *hot* water. Temporary deafness was caused.—E. T. Jones, L. i./14,277. *See also* Ill Effects *postea*.

Quinine Sulphate storage.—Loss of water and consequent increase of alkaloidal content.—C. E. Sage, P.J., ii./27,264.

It is prescribed in pill, cachet, slipule, tablet or mixture—if in mixture 1 minim of Dilute Sulphuric Acid to the grain of salt will render more soluble (with fluorescence). For pills 1 drop of strong Sulphuric Acid as excipient for 5 grains.

Incompatible with alkalis and alkaline carbonates, also incompatible with Liquor Ammonii Acetatis (unless distinctly acid in reaction), iodides, and astringent infusions containing tannin. The addition of a small proportion of sodium hypophosphite may overcome the incompatibility with potassium iodide—*i.e.*, the formation of herapathite (quinine iodosulphate).—To prevent coagulation of the precipitate when prescribed with alkalis, mucilage of acacia should be ordered. With Phenol in a pill may liquefy.

The heating of Aqueous Solutions of Quinine and Cinchonine Salts to boiling point (98 to 102° C.) is stated to convert the alkaloids into toxic isomers. Long exposure to sunlight is said to do the same.—C.D. ii./12,475.

Flavoring—Glyl Vanillæ, Glyl Menthæ Piperitæ (bold doses); Syrupus Aurantii. Liquid Extract of Yerba Santa in ½ drachm dose, diluted takes away the taste to some extent.

Uses.—For all forms of fevers, and as prophylactic; wards off remittent fever. For neuralgia and nervous headache; it combats whooping cough, influenza (Ammoniated Tincture) and hay fever. It increases uterine action, and is the most used tonic drug; antiseptic in typhoid, phthisis and pneumonia. Pills of Quinine, Atropine, and Arsenic (*q.v.*) will frequently stop the development of a "cold." If Quinine deafness occurs, or for large doses, hydrobromic acid should be used. In labyrinthine disorders, it is very uncertain—often intensifying the symptoms. May be administered by Iontophoresis.

Quinine affects metabolism. The total solids excreted by the urine may drop 40% within 24 hours after a single dose.

Slipules contain 1, 2, 3, and 5 grains.

Klein discovered that quinine is excreted (and therefore presumably absorbed) more slowly when given hypodermically than when given *per os.* In malaria it is a good plan to give both *per os* and hypodermically simultaneously, so that if rejected by the stomach there will be no loss of time. Children bear quinine well. A child of ten will tolerate an adult dose, a child of five will take 5 grains twice daily, and a child of one year will take 3 grains twice daily without risk. Quinine should be kept up in full doses for about a fortnight after the fever has ceased, and then continued in doses of 10 grains twice daily on two consecutive days in each week. If the drug is stopped, even after two or three weeks of thorough treatment, relapses are the rule, and it is generally only after the occurrence of the relapse that the average hospital patient begins to take seriously the advice to continue the use of the quinine.

For Malaria treatment with Quinine, see p. 743.

Quinine in Various Affections.

PNEUMONIA.—Quinine given in the earliest possible moment very closely approaches a specific. Continuous treatment with small doses every two or three hours. Quinine is inimical to the progress of most acute infections. In the case of pneumonia it acts remarkably in limiting the spread of consolidation and in altering for the better the entire aspect of the disease. Calomel must be given at the outset to cleanse the whole alimentary tract. Sodium Sulphate may be combined with the Quinine.—W. J. J. Arnold, B.M.J. ii./13,102.

The late R. W. Allen considered Quinine a useless drug theoretically for treatment of a common cold. It is only antiseptic in strength of at least 1 in 500 solution, and a few grains daily internally are not likely to reach the nasal mucus to disinfect it.

☛BEDSORES treated by an ointment of Quinine alkaloid 4 grains, Oleic acid 12 grains, dissolved on a water bath and mixed with Resin Ointment 1 ounce, said to be useful.—Pres., Nov., 1911, p. 281.

PUERPERAL SEPTICÆMIA well treated by internal use of 2 grains every four hours; also used with advantage in perityphlitic abscess, gall bladder abscess and empyema immediately after operation and prior to and after operations in bone and joint disease.—V. J. Glover, L. i./17,352.

TO INDUCE SLEEP.—Quinine—1 to 2 grains at bedtime stated to have excellent effect (from the '*Hospital*').—P.J. ii./13,526.

DIPHTHERITIC OPHTHALMIA and all cases of infective and sloughing ulcers of the cornea are treated with 1% solution with the smallest possible quantity of dilute sulphuric acid.

'MEDICINAL INDUCTION' OF LABOUR (*Castor Oil and Quinine*).—2 ozs. of castor oil is given and an hour afterwards ½ an ounce of a mixture containing quinine sulphate 10 grains, dilute sulphuric acid 10 minims, glycerin 20 minims spirits of chloroform 5 minims, and water to ½ ounce. One hour after a simple enema is given. Two hours later another dose of the mixture, also three hours later and again after four hours. Forty grains of quinine are used. Greater percentage of successes than with Pituitrin. Less danger with Pituitrin when preceded by Quinine course. Quinine is definitely able to act upon a closed cervix.—K. V. Bailey, B.M.J. i./26,18; L. i./26,282.

EFFECT OF QUININE ON THE UTERUS. It does not excite the normal pregnant uterus and therefore will not act as abortifacient in health, but it will excite the uterus in pathological conditions and strengthen uterine contractions in labour.—B.M.J. i./23,156.

BLACKWATER FEVER.—No evidence that Quinine administered by any method during an attack increases severity or influences progress of the disease apart from its effects on malaria.—L. S. Dudgeon, Pr., April. 1921, p. 283.

QUININE HÆMOGLOBINURIA occurs in people suffering from chronic malarial cachexia induced by several attacks of malaria, for which Quinine in small, irregular and insufficient doses has been taken. Disease precipitated by taking comparatively large doses of Quinine during an attack of fever. Recovery after stopping all Quinine until hæmoglobinuria disappears, and then giving the drug (bihydrochloride) in small and increasing doses preceded by Calcium Lactate.—N. Cantlie, Jl. Trop. Med., Feb. 1/23,40.

EXOPHTHALMIC GOITRE.—Give 0·8 Gm. Quinine Sulphate in two portions and increase slowly daily for 8 days, then 8 days' rest and so on until appearance of definite results, when reduce to 3 days a week till cured.—Per Chininum, 204. *See also* under Quinine Hydrobromide.

ANÆMIC OR CACHETIC DROPSY.—Quinine is a reliable diuretic, but does not produce results in healthy or non-œdematous persons.—Per Chininum, 206.

Quinine tablets should not be given to DYSPEPTICS. They should be taken with food, and never given to patients on a hydric diet. Case recorded in which 17 tablets of Sulphate of Quinine were emitted in two stools in 48 hours.—R. Le Dentu, per Jl. Trop. Med., Nov. 1/23,336.

Collunarium Quininæ, Quinine Nasal Douche.

Quinine Sulphate 1, Water 1000.

Used in hay-fever. If a stronger solution be required, use the Acid Sulphate or Hydrochloride of Quinine; avoid excess of acid.

Mistura Chlori cum Quinina (Burney Yeo).

To Potassium Chlorate, in powder, 30 grains, in a 12-ounce bottle, add Hydrochloric Acid 60 minims; cork and shake well to liberate chlorine; absorb this by gradually adding, and shaking after each addition, Distilled Water *q.s.* to 11 ounces; add Quinine Sulphate 24 grains (or 36 grains if ordered), Syrup of Orange 1 ounce. *Dose.*—1 ounce (**30 Cc.**) every 2, 3, or 4 hours for typhoid; it quickly cleanses the tongue.

Pills and Tablets of 1, 2, 3, 4, and 5 grains are prepared.

Perles of Quinine Sulphate contain 1½ grains (**0·1 Gm.**) in each.

B P1 **Pilula Quininæ Hydrargyri et Opii.**

Quinine Sulphate 1½ grains, Grey Powder 1 grain, Opium ⅙ grain, Quassia Extract *q.s.* thrice daily after food.

In syphilis Quinine is useful before or after a course of Mercury.

Acts beneficially in any septicæmic state with fever, whether due to gonorrhœa, syphilis, or enteric. Quinine, Opium and Mercury are sheet anchors in early syphilis.

Ⓟ **Pilula Quininæ Ipecacuanhæ et Camphoræ.**

Dose.—One night and morning.

Quinine 2 grains, Ipecacuanha ¼ grain, Camphor ¼ grain, Liquid Carbolic Acid ¼ minim, have been advocated as preventive of plague. Nim fumigation (burning Azadirachta) also suggested.

𝔓1 **Pulvis Quininæ Compositus.** *Dose.*—One powder.

Quinine Sulphate 5 grains, Phenacetin 5 grains, Arsenious Acid $\frac{1}{50}$ grain, Nux Vomica Extract ¼ grain, Milk Sugar (*q.s.*) to 12 grains. One powder (or cachet) every four hours till the fever breaks. This is used as a fever remedy in Demerara and is excellent.—Ph. Notes.

𝔇 𝔓1 **Pulvis Quininæ, Arsenii, Hydrargyri et Ipecacuanhæ Compositus.**—*Dose* in Cachets.—One at eleven, another at bedtime.

Quinine Hydrochloride 5 to 7 grains, Arsenious Acid 1/36 to 1/24 grain, Compound Ipecacuanha Powder 3 to 4 grains, Calomel 1/10 to 1/6 grain.

In chronic malaria with enlarged spleen. Each ingredient serves a useful purpose—the Mercury for its antiseptic effect, the Arsenic enhances the activity of the Quinine, the Opium, not only from its traditional use in malaria but also from the writer's experience is of value as an addition to the prescription.—Cantlie.

𝔇 𝔓1 **'Old English' Fever powder.** Quinine Bihydrochloride 3 grains, Arsenious Acid 1/36 grain, Compound Soap Pill 1 grain, Calomel 1/12 grain. Three times daily in a cachet. Malaria well treated. The following daily dose made up in the form of a pill recommended as prophylactic:—Quinine Bihydrochloride 1½ grain, Arsenious Acid 1/100 grain, Compound Soap Pill 1/10 grain, Calomel 1/25 grain.—Jl. Trop. Med., Aug. 15/22,265.

Quinine has taken the place of Opium in the treatment of malaria with poor results—efficacy of the old "English Fever Pill." Evils of State interference. —Sir J. Cantlie, Jl. Trop. Med., Jan. 15/23,30.

Mistura Quininæ Effervescens.

Quinine has a reputation in colds, but it is best given in effervescence. The following prescription is useful:—

Mixture A.—Quinine Sulphate 2½ grains, Citric Acid 10 grains, water to ½ ounce.

Mixture B.—Potassium Bicarbonate 10 grains, Ammonium Carbonate 2½ grains, Syrup of Orange 1 drachm, water to 1 ounce.

One tablespoonful of Mixture (A) with two of Mixture (B) in effervescence thrice daily.—Leonard Williams, per C. & D., June 1921.

Roseberry's Chlorine Water Mixture (Modified). An infant suffered from vomiting and diarrhœa and was unable to take milk or foods such as Glaxo. The usual antiseptic and astringent infantile powders failed to cure. The modified Roseberry's Mixture containing Quinine Sulphate with Salol 4 grains, Mucilage of Tragacanth *q.s.*, and Chlorine Water to 1 ounce, thrice daily, gave no lasting relief. Rectal Saline was also tried. Finally, as last resource, when the child was not expected to live, weak tea infusion saved its life.—Capt. G. H. Wood, per Jl. Trop. Med., April 15/22,109.

Tinctura Quininæ Ammoniata (*B.P.* '14).

Dose.—½ to 1 drachm (2 to 4 Cc.).

Quinine Sulphate 2, Alcohol (60%) 90; mix and add Solution of Ammonia 10. The Quinine precipitates on adding to water; a few grains of Tragacanth will suspend the precipitate; with syrup of orange it is palatable, and bears dilution better; it remains bright if mixed with aerated water. Should be kept in the dark, or it will become discoloured.

Ammoniated Quinine Slipules and **Tablets** are prepared, each equivalent to 1 drachm of the preceding Tincture.

Mistura Quininæ Composita, L. H. *Syn.* **Broadbent's Mixture.**
Dose.—$\frac{1}{2}$ ounce (15 Cc.).

Ammoniated Tincture of Quinine 1 drachm, Solution of Ammonium Acetate 2 drachms, Compound Tincture of Camphor $\frac{1}{2}$ drachm, Ammonium Carbonate 2 grains, Peppermint Water to $\frac{1}{2}$ ounce.

Mistura Quininæ Ammoniata, St. M.'s H.
Dose.—$\frac{1}{2}$ to 1 ounce (**15 to 30 Cc.**).

Ammoniated Tincture of Quinine 1 drachm, Solution of Ammonium Acetate 2 drachms, Sodium Nitrite 1 grain, Tragacanth Mucilage 1 drachm, Chloroform water to 1 ounce.

Tablets Ammoniated Quinine Compound, each equivalent to Ammoniated Tincture of Quinine $\frac{1}{2}$ drachm, Capsicum $\frac{1}{10}$ grain, Camphor $\frac{1}{10}$ grain, Caffeine Citrate $\frac{1}{4}$ grain, Aloin $\frac{1}{20}$ grain. Serviceable in influenza.

Tablets Quinine Acid Sulphate 1 grain with Camphor $\frac{1}{5}$ grain, also this combination Ⓟ with Aconite Tincture 1 minim.

🄿 🄿1 **Tablets, Quinine, Camphor Morphine, and Atropine**—Camphor $\frac{1}{2}$ grain, Quinine Sulphate $\frac{1}{2}$ grain, Morphine Sulphate $\frac{1}{64}$ grain, Atropine Sulphate $\frac{1}{2000}$ grain.

For common colds, especially where excessive running at eyes and nose.

Ⓟ**Tinctura Antiperiodica.** *Syn.* **Warburg's Tincture.**

Warburg's Tincture was originally introduced by the maker as a proprietary remedy, but he published his formula, and in 1890 was in absolute penury.—C.D. i./13,598.

Socotrine Aloes 240 grains, Rhubarb 80 grains, Angelica Fruit 80 grains, Elecampane Root 40 grains, Saffron 40 grains, Fennel Fruit 40 grains, Prepared Chalk 40 grains, Gentian 20 grains, Zedoary Root (*Curcuma Zerumbet*) 20 grains, Cubebs 20 grains, Myrrh 20 grains, White Agaric, in powder, 20 grains, Opium, in powder, $2\frac{1}{2}$ grains, Black Pepper 4 grains, Cinnamon 8 grains, Ginger 8 grains, Alcohol (60%) 1 pint. Macerate for 7 days, press and strain. Dissolve in the product:—Quinine Sulphate 160 grains. Camphor 20 grains. After 2 days filter, add Alcohol 60% *q.s.* to 1 pint. The aloes may be omitted *if so prescribed.*

Dose.—1 to 4 drachms or more (**4 to 15 Cc.**)

Flavoring.—Glyl Coriandri, Glyl Menthæ Piperitæ; Extractum Glycyrrhizæ Liquidum.

Originally directed for Indian Fever, ague, &c., half an ounce as a dose repeated in 2 or 3 hours; before giving the first dose the bowels should be freely opened, and no food recently taken. Between the two doses nothing should have been taken but a little brandy or beef-tea, and this only if required.

The name 'Antiperiodica' suggests 'abortifacient,' to French Customs Officials.—P.J. i./11,763.

Zedoary Root. *Curcuma Zedoaria* (*N.O. Scitaminaceæ*). *Dose.*—10 to 30 grains (**0·6 to 2·0 Gm.**). Little used now. Ginger replaces it. *Tinctura Zedoari* (*Simplex*). *Dose.*—1 to 2 drachms (1 in 8 Alcohol 90%).

Effervescent Quinine Sulphate.—2 grains in drachm. *Dose.*—**1 to 2 drachms, given as soon as fever shows itself.**

Quininæ Sulphas Acidus, Quininæ Bisulphas, U.S., Ph. Ned. IV., Ph. Jap. III. (now omitted), **P. Hung.** Termed '**Neutral**' in Fr. Cx. and F.E. $C_{20}H_{24}N_2O_2.H_2SO_4+7H_2O=548.4$.

Dose.—1 to 10 grains (**0·06 to 0·6 Gm.**).

Quinine Bisulphate changes into quinicine or quinotoxin—possibly a harmful body. The crystalline salt ($+7H_2O$) decomposes to the extent of 0·25% at 60° C., but the exsiccated shows no decomposition at this temperature. The heating of *strong* solutions is deprecated. The Acid Hydrochloride or the Acid Hydrobromide are better for hypodermic injection.—B. F. Howard and O. Chick, P.J. ii./17,143; C.D. ii./17,612, *vide* also our pp. 720 and 724.

Tablets. $\frac{1}{2}$, 1, 2, 3, 4 and 5 grains.

Usually masses of crystals; 59·1% of Quinine. Soluble 1 in 11 of cold water, and is therefore a suitable salt for preparing eye lotions. Three grains to an ounce of water has a specific action on ophthalmic diphtheria. Incompatible with Potassium Iodide.

MALARIA TREATMENT.—Quinine Bisulphate 4 grains in 20 minims of 0·5% Saline solution subcutaneously once daily for five consecutive days in alternate flanks. In addition Arsenious Acid 1/20th grain *per os* and also 5 grains (only) of Quinine well diluted in the early morning—continue for a month.—C. A. Johnston, B.M.J. i./18,586. ***We should prefer the Hydrochloride or Acid Hydrochloride.***

For Malaria treatment, see also p. 743.

CYSTITIS treated by Quinine Bisulphate 1 in 2,000 as an irrigating solution. Irritation is not noticeable. It will inhibit growth of *B. Typhosus* in the strength of 1 in 30,000.—E. McDonald, Jl. Amer. Med. Assn., Feb. 6/15,505, per P.J. i./15,287.

Tablets of Quinine Rhubarb Compound, also called **Livingstone Rousers** contain Quinine Acid Sulphate 1 grain, Jalap 1½ grains, Calomel 1 grain and Rhubarb 1½ grains; are given to check malarial poisoning.

In purulent ophthalmia, hypopyon and keratitis *Guttæ* containing **3 grains with 12 grains of boric acid per ounce are useful.**

Pi **Esanofele.**—A proprietary preparation in pill form containing in each Quinine Bisulphate 0·09 Gm., Arsenious Acid 0·0009 Gm., Iron Citrate 0·027 Gm., Extract of Bitter Herbs 0·145 Gm.

Used in malaria.

Dose.—For a child 3 to 6 years: two pills daily preferably in the morning, *e.g.*, one at 6 and another at 9. For 7 to 14 years two at 6 and two at 9. For adult six daily *e.g.*, two at 5, 8 and 11 a.m. respectively. Fifteen days constitute a course.

Quininæ Tannas, Quinine Tannate, P. Jap. (30% Quinine). **P. Helv.** (30—35%), **P.G. VI., Ph. Ned. V.** and **P. Dan.** (30—32%).

P. Austr. and **P. Hung.** give method of making from the sulphate.

Dose.—1 to 4 grains (**0·06 to 0·25 Gm.**). An amorphous yellowish white powder, obtained by the decomposition of the sulphate with a solution of tannin, contains about 30% of Quinine (U.S. between 30 and 35%) and is slightly soluble in water and about 1 in 3 alcohol 90%. Being almost tasteless it is recommended for children, to be given in milk.

It has, however, the disadvantage of splitting up only slowly into its constituents in the intestines, hence lacks in promptitude and certainty.—P. May.

With 1 molecular proportion of Neutral Quinine Sulphate to a little more than 3 of Tannic Acid the precipitation is complete.—Schmidt.

Tabellæ Quininæ Tannatis.

Contain 1 grain in a chocolate basis. Suitable for children. As a prophylactic to malaria. Have also been given for whooping cough and as a stimulant in entero-colitis in children, and with ergotin for sweating.

Quinine Urethane (**Hydrochloride**). *Dose.*—½ to 3 grains (**0·03 to 0·2 Gm.**)

Employed hypodermically, as it is non-irritating.

Obtained by heating Quinine Hydrochloride 3 with Urethane 15 and Water 3 parts. *For details of Urethane see p.* 824.

MALARIAL COMA.—The only treatment found of value was Quinine Hydrochloride 0·4 Gm. with Urethane 0·2 Gm. in 15 Cc. Normal Saline intravenously;

also valuable for persistent fever and chronic forms of malaria. Painless Intramuscularly not advised.—Richet and W. B. Griffin, B.M.J. i./17,190.

Malarial anæmia.—The following was useful in Salonika during the war: Quinine Bihydrochloride 0·8 Gm., Urethane 0·4 Gm., Distilled Water 2 Cc. Intramuscularly in gluteal region. In *infants* intramuscular injection of 0·05 Gm. Quinine Formate daily, and later every other day, for 8 to 10 injections.—Leon Tixier, per Chininum, 127,129.

Lobar pneumonia.—Intramuscular injections of 5 Cc. of a solution of Quinine Hydrochloride 0·5, Urethane 0·25, and Water 5·0, of value; repeat in 24 hours and again in 48 hours if necessary.—Per Chininum, 178.

Injection Treatment of Varicose Veins :—

Quinine Urethane is said to be the method of choice. Quinine Hydrochloride 4 Gm., Urethane 2 Gm., Distilled Water 30 Cc. The solution can be boiled and is strongly antiseptic. Crystallises out when cool but redissolves on immersing in hot water for a few seconds. *Initial injection* 1 Cc. and subsequently 2 to 3 Cc. Clean skin with Ether and introduce needle of syringe not quite filled with solution into lowest segment of the vein. Withdraw piston slightly and allow blood to flow into barrel before any fluid is introduced: inject ¼ to ½ Cc. according to size of vein and hold needle in position for 30 seconds before withdrawal. Press a pledget of wool on puncture and repeat process 2 inches further up the limb. When total number of injections has been given clean with Ether and seal punctures with Collodion dressings.—A. H. Douthwaite, B.M.J. ii./26,554, and a Brochure (H. K. Lewis), 1927.

Varicose ulcers well treated, with Zinc Gelatin in addition.—R. Gibson and A. R. Somerford, B.M.J., i./28,978.

'Sterules' Quinine Urethane, 2 Cc. for Varicose Veins, of the above formula are prepared.

Quininæ Valerianas. 'Basic' Quinine Valerianate, Fr. Cx., P. Ital. IV. $C_{20}H_{24}N_2O_2,C_4H_9.COOH=426·288$.

Dose.—1 to 4 grains (**0·06 to 0·25 Gm.**).

White crystals, or powder with slight valerianic odour, contains 76% of Quinine, soluble 1 in 80 to 90 of cold water.

Pills containing 1 grain each of the Valerianates of Quinine, Iron, and Zinc. For nervous headache and hysteria.

For treating paroxysmal sneezing, H. Tilley finds these useful.

Ⓟ**Capsulæ Valerianatum Compositæ.** Form I.

Dose.—One thrice daily. Valerianates of Quinine, Iron, and Zinc 1 grain each, Nux Vomica Extract ¼ grain, with or without Cascara Extract 1 grain. Taste and odour covered with Saccharin and Mint. Total weight of Capsule 10 grains. Nervine tonic.

P1**Capsulæ Valerianæ Compositæ,** Form II. *Dose.*—One after meals thrice daily. Valerian Extract 2 grains, Phenol 2 grains, Strychnine Hydrochloride 1/40th grain, Codeine ¼ grain, Rhubarb Extract 1½ grains. Total weight of Capsule 10 grains. Tonic, antiseptic and nerve sedative for use in dyspepsia.—G. Rankin, B.M.J. i./15,1036.

Quinine Ethylcarbonate. **P. Jap., P. Helv., U.S. X., Ph. Ned. V.**
Syn. ✱Euquinine. (T.M. 317242), $C_2H_5O.CO.OC_{20}H_{23}N_2O$.

Patent 4991 (1896) and 22639 (1899)—now public property. German Patent 91370 (18/12/95) with addition of 123748 (30/1/00). U.S., Patent 585068 (1897). *cf.* also Aristochin.

Dose.—3 to 15 grains (**0·2 to 1 Gm.**) in cachet.

Manufacture.—Prepare Ethyl-Chlorocarbonate (B. pt. 94° C.) by passing Carbonyl Chloride into Absolute Alcohol, and allow the rectified product to react with Anhydrous Quinine in Ethereal solution when the Quinine Ethyl Carbonate is obtained on evaporating and washing with Sodium Carbonate solution *q.s.* to remove the acid.

$C_{19}H_{20}N_2.OCH_3.OH + ClCOOC_2H_5 = C_{19}H_{20}N_2.OCH_3.OCOOC_2H_5 + HCl.$ The method is reasonable chemically but the final substance is difficult to crystallise. This we believe is due to the fact that Carbonyl Chloride prepared by the usual laboratory processes is impure.

The patent specification processes are probably misleading. They speak, for example, of adding gradually Quinine 6·5 kilos to "30 kilos of Benzol solution containing 12% of Phosgene gas," etc., or "adding Quinine 5 kilos to a solution of 1·8 kilos of Chloroformic Ethyl Ether in 20 kilos of Benzol."

White needle crystals, M.pt. 89 to 91° C., with little taste, sparingly soluble in water, more so by addition of dilute acid; easily soluble in alcohol. Intended to replace quinine. **Tablets** contain 8 grains.

Whooping Cough has been treated with it.

Other salts of Quinine in occasional demand are the **Hydrochloro-sulphate, Iodate, Lygosinate** and **Sulphocarbolate.**

Aristoquinine. *Syn.* ✱ARISTOCHIN. Ph. Ned. V. (T.M. 238180 and 322521).

$CO(C_{20}H_{23}N_2O_2)_2 = C_{41}H_{46}N_4O_5$ = 674·.4. The carbonic ester of quinine in white tasteless powder containing 96·1% of quinine *Dose.*—1 to 10 grains (0·06 to 0·6 Gm.) according to age.

Patents: 16564/1898—now public property. U.S.A. Patent 625075/1899. Example of process from the patent specification:—

Dissolve 1 kilo. of anhydrous quinine in 4 kilos. of chloroform, and pass 76·4 Gm. of phosgene into the cooled solution. To remove quinine hydrochloride formed in the process and small quantities of unaltered quinine, wash the liquid with 1 per cent. acetic acid in water until the extracts no longer taste bitter. The diquinine carbonic ether is then removed from the chloroform solution by shaking with 1 per cent. sulphuric acid in water. Finally treat the sulphuric acid solution with alkalies and shake out with ether. Evaporate the ether and recrystallise from alcohol or benzene.

The method seems probably correct and indicative of the actual process employed. The yield of the substance, is, however, poor. *Further data on manufacture, Edn. XVIII., p.* 729.

Insoluble in water. Given for malaria, typhoid, influenza, and in small doses for pertussis.

Incompatible with Acids and Alkalis.

Analysis. The compound should, of course, be free from Chlorine. A commercial sample contained 6·9%.—L. ii./21,400.

Quinoidine.—*Dose.*—2 to 4 grains (0·12 to 0·25 Gm.) thrice daily.

The name given to a mixture of alkaloids (discovered by Seturner, 1830) in the mother liquor after the crystalline alkaloids have been separated. It occurs generally as a dark treacly compound or as a hard mass.

These substances being amorphous and hence, perhaps, more readily absorbed, it has been suggested are of greater value than the Sulphate and Hydrochloride of Quinine. *Benign tertian* cases required 9 to 13½ grains of Quinoidine to stop fever; *Malignant tertians* required an average quantity of 10 to 16 and *Quartan cases* an average of 22 to 24 grains.

P1 **Laverain Tablets.** *Dose.*—Up to 6 or 12 during the day.

Contain Quinoidine 2 grains, Ammonium Picrate ½ grain, and Arsenious Acid 1/100 grain. The Picrate is employed as an anti-malarial drug in addition to the quinoidine. The Arsenic acts as tonic. **The preparation is said to be prompt in reducing malarial fever, and specific for the malarial parasite—good in prophylaxis. A preliminary purge to be given (Calomel and Soda) washed down with Mistura Alba. Out-patients are given 20 tablets, enough for three days' use.—Maj. Waters, Ind. Med. Gaz., 1916. See also D. G. Marshall, L. ii./18,417.**

Quinine Salts in Malaria.

For the Etiology of Malaria and a Classification of the Parasites, see Vol. II.

Quinine, eight grains daily, or more, sufficed almost invariably to improve cases greatly while being taken, but failed to cure them completely even after 6 weeks' administration or more. According to the theory elaborated by Sir R. Ross and D. Thomson parasites continue to breed in the blood by the known method from the moment of infection until the last of them has died out. The number of parasites in high fever runs from 5000 to 300,000 per cub. mm. of blood. Even if there were originally 1 parasite per cub. mm. it would mean 3,000,000 in the body. Unfavorable climate, fatigue, etc., tend to precipitate relapses in malaria. While the infection continues there is a constant struggle with varying fortune between the invaders and the opposing forces. According to Lipkin, Quinine is concentrated in the suprarenals, kidneys and spleen ; cast out quickly from the lymphatic glands and the blood ; and destroyed by the liver and muscles. Large numbers of the plasmodia are hence likely to escape any dose we can give. The *last* plasmodium must be destroyed. Anything under 60 grains a week appears useless in the large majority of cases and anything over 15 grains daily seems only to be required when there is fever, and say, for a week or fortnight afterwards, followed by 10 or 15 grains daily for months. *Ten grains daily carried out rigorously for 3 months (84 days) is sufficient in the majority of cases.*—Sir Ronald Ross, B.M.J. ii./21,1 *et seq.*

(Sir Ronald Ross purposely refrains from dealing with the virtues of the various Quinine Salts.)

Oral Use.

The following routine treatment of malaria has given good results, the average length of treatment being 7 days :—

I. *Alkaline Mixture* (Sinton) (for adult) Sodium Bicarbonate 60 gr., Sodium Citrate 40 gr., Water to 1 oz.

II. *Quinine Mixture* (Sinton) (for adult) Quinine Sulphate 10 gr., Citric Acid 30 gr., Magnesium Sulphate 60 gr., Water to 1 oz.

On the first day 4 doses of I and 2 of II, the latter 15 minutes after the former : for next 4 days 3 doses of I followed after 15 minutes by 3 doses of II : and for next 2 days 2 doses of I followed by 2 doses of II, a total amount of 180 grains Quinine Sulphate in solution being taken.—K. V. Raju, I.M.G., May, '25,212.

Quinine said to act better in treatment of malaria when given in an ***alkaline medium.*** Arguments have been brought forward to show that malaria is an acidosis—results of experiments.—Maj. J. A. Sinton, Jl. Trop. Med., April 2/23,116. *See also* ' Alkaloidal Notes ' and Quinine-Mannitol.

The **International Health Board U.S.A.** made a vast malarial survey in one of the counties of the State of Mississippi. Over 30,000 people were examined and the conclusion was that Quinine will cure all cases of malarial fever if it is given in the right doses for a sufficiently long period. Based on these results, the National Malarial Committee of the U.S. Public Health Service adopted what is known as the standard treatment for malaria in the U.S.A. In malarial districts officials in the U.S. conduct active propaganda in their localities to inform the public, and it is thought that, in a few years, a large diminution in malaria may be effected. In the leaflet on the **Standard Treatment** it is stated that, to be most effective, Quinine should be taken one dose (10 grains for a person of 15 years or older), ***every night before retiring, for eight weeks without intermission.*** If a person is ill with acute malaria he should take the dose according to his age about three times each day for not less than three days. This will stop the fever or chills and fever. He should then take one dose every night for eight weeks to get the malaria out of his system. Said to be 100% efficient.—See also C. C. Bass, N.Y. Med. Jl., June 20, 1923, per Jl. Trop. Med., Aug. 15/23,270.

Given in 10-grain doses 2 hours before the expected rigor, paroxysm, or accession of pyrexia, followed by 5 or 10 grains in 4 hours, the attack can be overcome in 3 days. The treatment must be continued 8 or 10 days in 9- or 15-grain doses daily. This suffices in the majority of cases, both as curative and prophylactic.—Catholic Medical Guardian.

Quinine by the mouth is absorbed into the system in about half the time in which it is absorbed from an intramuscular injection. In both cases it cannot be detected in the urine after 26 hours (Fletcher).—A. E. Horn, Int. Conf. Trop. Am., '24,560.

Malaria control on a large scale is easily effected by use *per os*—not inferior to other modes.—J. W. Van der Spek, Chininum, 51.

Insoluble salts were found ***as good as soluble*** for oral use and administration in solid form compares favourably with a solution.—N. P. Macphail, Int. Conf. Trop. Am., '24,95.

In India after proving a case to be malaria by examining a smear as much as 30 grains is given in a bad case. This causes bad headache, but clears up the attack in a short time, barring a relapse.—R. E. P.

Malaria in Uganda. Routine treatment Quinine Hydrochloride, *per os*, sometimes intramuscularly in addition.—J. A. Taylor, B.M.J. i./20,113.

Quinine with Calomel.—Give Calomel first. Quinine always in solution with a little Sulphuric Acid. Wait until a high temperature has subsided before giving. Never give it on an empty stomach, and in many cases give a little alcohol after.—E. Yeates, B.M.J. ii./17,878; i./18,603.

Calomel salts and initial large doses (30 to 45 grains daily) of Quinine. Malaria in Antigua.—W. M. McDonald, B.M.J. i./22,597.

Give small dose of Calomel (1 grain), repeated each night. Give the Quinine (Hydrochloride) in 3 or 4 grain doses, *before* meals and at bed-time, with 3 or 4 ounces of water. Continue for two months.—T. Stone Dixon, B.M.J. i./23,1087.

Quinine in combination with Arsenic, in the treatment of chronic forms of malaria, more efficient than Quinine alone. Methylene Blue used in combination with Quinine in cases of quartan fever which do not react to Quinine alone.—R. N. Chopra, per Jl. Trop. Med., Feb. 15/23,69.

Subtertian Cerebral Malaria treated with Quinine and Galyl—the quinine *per os* (20 grains thrice daily) and intravenously (0·8 Gm.) over a period of time and the galyl (0·2 Gm. to 0·4 Gm.) subsequently intravenously.—A. W. Falconer and A. G. Anderson, L. ii./17,486.

Malaria in the Salonica Army. Quinine *per os* found preferable to intravenous use—give a salt which dissolves slowly, *e.g.* the sulphate. Investigation showed that the intravenous method produces the shortest stay of quinine in the system. Intramuscularly in oil gives the *longest* retention. Arrhenal 0·2 to 0·3 Gm. to be injected on two successive days, alternating with two days of treatment with 2 Gm. of Quinine.—L. ii./17,358.

ACTION OF QUININE IN MALARIA. The action of Quinine in malaria is probably to narcotise the extra-cellular parasites and paralyse their movements without having much effect on the leucocytes, and to aid the immune reactions on intracellular parasites.—Sebastian L. Rodrigues, "The Antiseptic," Madras, Dec./22.

It was found in a case of idiosyncrasy that **Cinchonine** base was better tolerated than Quinine Acid Hydrochloride *vide* pp. 724, 746.

A writer deplores 'fetish' of giant doses to reduce high temperature in malaria. Cinchona preferable to Quinine. In hyperpyrexia use of antipyretics such as Aspirin, Antipyrin, etc., until moderate temperature attained, when Quinine may be resumed.—Jl. Trop. Med., Aug. 15/22,266.

See also Quinidine p. 719, *Cinchona Febrifuge, p.* 719 *and Quinoidine, p.* 742.

Intravenous Injection (Quinine Acid Hydrochloride).

For details of doses and strengths of injections, see p. 730.

MALARIA IN MACEDONIA.—The first essential was found to be an initial dose of calomel, followed if necessary by a saline aperient. Moderate cases received Quinine Sulphate 45 grains (the supplies of Hydrochloride being short) divided into 3 equal doses, for at least 3 days and longer if pyrexia persisted. 30 grain doses then continued. In more severe cases 60 grains *p.d. per os* were given or in part intramuscularly. In cases of persistent vomiting or marked digestive disturbance oral quinine is either rejected or remains largely unabsorbed, and the advantages of the intramuscular method are very great. It was found convenient in these cases to give two intramuscular injections, each of 20 grains, one in the morning, the other in the evening, supplemented by 20 grains of the bihydrochloride by mouth in the course of the day. As soon as the severer symptoms were under control oral administration of quinine was resumed. On the earliest appearance of cerebral symptoms ***10 grains of the Acid Hydrochloride*** intravenously in ***20 Cc. of diluent*** saved many lives.—A. G. Phear, L. i./20,195.

There is no decisive experimental proof of the superiority of injections of Quinine.—Sir R. Ross, B.M.J., i./20,130.

Malaria is not more readily cured by intravenous medication. 90% of the Quinine injected intravenously disappears from the blood within one minute and is *stored in the tissues.* Intravenous medication will always have a more or less restricted field of usefulness.—B.M.J.E. ii./22,33.

Observations on 1314 cases of malaria by intravenous injection of Quinine. —Capt. N. Cantlie and El Sach Yusef Effendi Moubarak, Jl. Trop. Med., Feb. 15/24,38.

Quinine intravenously ½ to 1 Gm., in 40—50 Cc. Saline, 2 to 10 times daily, gave good results in 164 cases of malaria; no general or local reactions or complications.—Med. Sci., July '25,266, per Pres., Jan. '26,28.

Quinine Bihydrochloride efficacious intravenously in acute and chronic malaria, and in cases in which malaria complicates other diseases: also used in pneumonia and septicæmia with success.—B. Rattan, B.M.J., ii./27,39.

Intravenously in chronic malaria. Violent and excruciatingly painful reactions, but of great efficacy.—Pierre Millous, per Chininum, 102.

Intravenously Quinine is no better than any other methods and has many disadvantages (thrombo-phlebitis, cinchonism): reserve for severe attacks.—J. W. Van der Spek, Chininum, 50.

CEREBRAL MALARIA well treated by Quinine intravenously—0·5 Gm. of the Bihydrochloride in 10 Cc. of water slowly injected—followed by cisternal puncture.—W. Cordes, U.F.C. '25,199.

PERNICIOUS MALARIA well treated with intravenous injection of Quinine Bihydrochloride 5 gr. in 20 Cc. Normal Saline with 10 m. Adrenalin Chloride solution.—K. N. Chatterji, I.M.G., Dec. '25,584.

Experiments in animals (sheep) indicated that Quinine Sulphate suspended in oil was weight for weight about 2·6 times less toxic than an aqueous solution of Quinine Bihydrochloride, when both were injected intravenously.—J. O. Shircore and Co-workers, Dar-es-Salaam, 1927.

Intramuscular Injection of Quinine Salts.

Hundreds of intramuscular injections of Quinine given over a period of 19 years without a single distressing result. Injections always given in the gluteal region, choosing the highest point where the muscle is deep enough to sink the needle in—not the ordinary short hypodermic needle, but one long enough to make sure of giving the injection well into the muscle. Injections should never be given into the arm.—R. A. Murphy, I.M.G., Jan., '25,48.

Intramuscular injection efficient and practical—danger of necrosis insignificant. Only the more soluble salts of value.—N. P. Macphail, Int. Conf. Trop. Am., '24,95. In the discussion which followed, C. C. Bass considered Quinine hypodermically or intramuscularly had no place in treatment of malaria and was a 'formidable procedure.' General trend of opinion, however, in favour of Macphail's views, with the reservation that intramuscularly it should be used only as a last resort in comatose or dangerous cases. Sir L. Rogers advocated use of Cinchonine in place of Quinine—more rapidly absorbed, less pain and no induration.

Muscular necrosis an invariable occurrence with ***intramuscular administration*** of Quinine in malaria. Damage is intensified, in case of alkaloid, by use of solvents such as Ether, Alcohol, Olive Oil or Creosote, and natural fat. Necrosis evident one hour after injection in man, and within ten minutes in animals.—Jl. Trop. Med., Jan. 1/23,12.

Intramuscular use of Quinine Salts was *condemned* by the Medical Service of the E.A.E.F.—A. R. Balmain, B.M.J. i./20,381.

Necrosis of muscle caused by Quinine injections into the buttocks—it was not possible to determine *form* of Quinine.—P. Figdor and D. D. Pinnock, B.M.J. ii./22,14.

Quinine Bihydrochloride exerts its influence on the tissues in two ways—(*a*) ***presence of the acid radical causes irritation, œdema and pain,*** (*b*) the base, acting as a protoplasmic poison, causes death of the surrounding tissues. The salts of the four main alkaloids of the Cinchona bark all cause œdema, irritation and necrosis.—H. W. Acton and R. N. Chopra, Ind. Jl. Med. Res., Oct. '24,251; B.M.J.E., i./25,60.

Intramuscular injection of alkaloidal salts of Quinine should be considered as malpraxis, as tissue is unable to live in presence of these bases at a high concentration, viz., 1 : 2,000 and there is danger of tetanus with imperfect sterilisation. Oral method the only method of administering Cinchona alkaloids, though rarely in grave cases, *e.g.*, cerebral malaria, Quinine Base should be injected intravenously.—H. W. Acton and R. N. Chopra, Ind. Jour. Med. Research, Oct. '24; per Jl. Trop. Med., Jan. 15, '25,32. *See also* J. Macqueen, L. i./27,1289.

Quinine intramuscularly reaches the blood only a little at a time, whereas intravenously it reaches the parasites in maximum strength.—Nicotra, Policlinico, Feb. 16, 1919.

In three grave cases of malaria, in which ordinary Quinine was of no avail, three injections of 'OPSONISED' QUININE were followed by sudden defervescence, rapid reduction of size of spleen, disappearance of plasmodia, and recovery. The vein was punctured during the paroxysms with a syringe containing 2 Cc. of a 50% solution of Quinine, with or without 1 Cc. of Spleen Extract, the needle left in the vein for two or three minutes, mixing the contents gently with the blood, and the contents reinjected into the vein.—Comptes Rend., per Jl. A.M.A., ii./25,856.

Studies on Quinine. An investigation into its action when injected in animals. R. A. Hatcher and S. Weiss, Jl. Ph. & Exp. Ther., Oct. '26,279. *See also ibid.* Feb. '27,327, *et seq.*

Rectal Injection of Quinine—30 grains Quinine Bihydrochloride in amounts of solution varying from 2—15 fluid ounces—followed by 'most *shocking and striking effects*'; *mucus and large shreds of membrane passed with pains and tenesmus.* Method ineffective as curative agent in malaria; parasites found in blood after a week of injections, when Quinine *per os* was successfully substituted (Fletcher).—A. E. Horn, Int. Conf. Trop. Am., 24,561. *See also* Jl. Trop. Med., June 1,/26,163 and July 2/23,229.

Quinine administered *per rectum* in malaria preferable to administration *per os*, in height of fever.—E. Bran, per Jl. Trop. Med., Mar. 15/23,101.

Subcutaneous Injection of Quinine finds few advocates. A *single drop getting into the skin produces necrosis.* Weak solutions, mixed with Urethane, recommended.—J. W. Van der Spek, Chininum, 50.

Absorption and Excretion of Quinine.—(See also expts. by M. Nierenstein, B.M.J. i./18,428).

"Most of the Quinine admitted by the mouth is, under ordinary circumstances, absorbed from the small intestine; a slight amount from the stomach, especially if administered while fasting and in the form of an easily soluble salt in water; a relatively smaller amount by the large intestine. Affections of the gastro-intestinal tract and liver influence the amount absorbed, as also do the food contents and degree of solubility of the salt given. Absorption is retarded if Quinine is given with, or soon after, food, also when the less soluble salts are employed. Rapid and energetic absorption is best obtained by giving a soluble salt during fasting; gradual and prolonged absorption by administering a less soluble salt with, or soon after, meals; under such conditions absorption is maintained at a considerable level for about eight hours. Thus, when sporu lation is regular, a soluble salt should be given during fasting, two or three hours before the paroxsym ; in other cases one of the less soluble salts should be given with, or soon after, meals, every eight hours. Captain MacGilchrist also regards *Quinine Salts as fundamentally unsuited for hypodermic use*, and therefore considers this method should be entirely *abandoned*. In intravenous injections great dilution, 1 in at least 150, is necessary to avoid the dangers special to Quinine. *Seven grains of Quinine Bi-hydrochloride should be dissolved in from two to three pints of saline solution.* This method is called for in cases of emergency. When there is a tendency to hæmoglobinuria, the Quinine Alkaloid, instead of one of its salts, should be used. Rectal injections, Captain MacGilchrist considers irritating, and of little value, and suppositories of Quinine are useless in malaria."—L. i./11,1221.

Malarial Relapses.

The best for old cases was a system carried out by M. Harrison **in an Investigation of Treatment under direction of Sir Ronald Ross.** It was used on 49 chronic cases, mostly of benign tertian. Only 10·2% relapsed. Fever was reduced in 12 to 24 hours, and no asexual parasites could be found after 48 hours.

Patient to remain in bed 12 days (this period may be reduced) and to receive intramuscularly in each deltoid muscle 15 grains of bi-hydrochloride daily with 10 grains of Quinine Hydrochloride in Mixture No. 1 (*infra*) thrice daily, totalling 60 grains of Quinine daily for the 12 days. Patient is then allowed up and receives for three days Mixture No. 2 four times a day (60 grains of Quinine daily by the mouth). Patient is then put on Mixture No. 3 four times daily for 14 days (20 grains of Quinine daily). Light work allowed.

Anticachexia Mixture No. 1. For a dose after food :—

Quinine Hydrochloride 10 grains, Tincture of Ferric Chloride 5 minims, Solution of Strychnine Hydrochloride 5 minims, Hydrochloric Solution of Arsenic 5 minims, Dilute Nitro-Hydrochloric Acid 5 minims, Magnesium Sulphate ½ drachm, Syrup of Tolu ½ drachm, Glycerin 10 minims, Water to 1 ounce.

Anticachexia Mixture No. 2.

As No. 1, but *add* Quinine Hydrochloride 5 grains and Dilute Nitro-Hydrochloric Acid 5 minims to the dose.

Anticachexia Mixture No. 3.

As No. 1, but *reduce* the Quinine Hydrochloride 5 grains and Dilute Nitro-Hydrochloric Acid 5 minims in each dose.—B.M.J. i./18,428.

In the majority of relapsing cases, ***Quinine per os is adequate—20 grains*** either daily or twice weekly during stay in hospital. Where this is inadequate combined oral and intramuscular administration (60 grains daily for 4 days).—E. B. Gunson and Co-workers, L. i./18,866.

In 'anti-relapse quinine prophylaxis' a short intensive treatment, *e.g.*, up to 180 grains of sulphate or hydrochloride in 3 days, effects cure in a substantial proportion of cases.—L. i./18,301.

Never seen a patient relapse a second time while taking 20 grains a day. In spite of general opinion, quinine may well be commenced *per os* as soon as malaria parasites have been found. To wait until temperature comes down is wasting time. Intravenous and intramuscular injections should be reserved for persistent vomiting or coma.—W. Fletcher, L. ii./18,432.

Relapses can be cut short by Quinine Sulphate in solution 10 grains three times a day for a week. After the week give ten grains regularly once a day. —Sir Ronald Ross, per T. H. Jamieson, B.M.J. i./19,739.

Quinine in malaria given orally as efficacious as by injection in prevention of relapses. Where oral administration is contraindicated intramuscular injection is simple and safe, but not recommended as routine treatment.—R. N. Chopra, per Jl. Trop. Med., Feb. 15/23,69.

To cure malaria one must act quickly and drastically. Once the relapsing stage supervenes nature and time alone will bring about the desired result, though Quinine may assist.—R. U. Moffatt, B.M.J. i./20,60.

Prophylactic Use.

Prevention. It has been proved by Warrington Yorke, S. P. James and others, that Quinine given to a patient just previously to his being bitten by infected mosquitoes is of no avail in preventing

or delaying the onset of the attack. It is important to know whether other remedies may be effective in this way.

On the first day of the month give a dose of Calomel and after the bowels are well cleared, 15 grains of Sulphate in dilute acid after a good meal. Repeat this on the 15th of the month. Pay attention to bowels at all times.—E. Yeates, B.M.J. i./18,603.

Enquiry in Forces in Macedonia. It is a bare investment for immigrants in the absence of protection against mosquito bites.—C. H. Treadgold, B.M.J. i./18,525. *Cf.* Abst. Malaria in Macedonia *antea* p. 745.

The only prophylactic for troops is 1/20 grain Arsenious Acid daily. Quinine is curative *only*.—C. A. Johnston, B.M.J. i./18,586.

Thorough treatment ranging from 5 to 10 grains on two successive days per week up to 20 grains daily, failed to prevent incidence of malaria in Salonica in 1916—17. It was estimated that at least 80 to 90% of units were infected. The prophylactic quinine was dropped in 1918 as no dose that could be tolerated had any protective value to troops exposed under campaigning conditions.—G. T. Rawnsley, B.M.J. i./19,501.

Quinine prophylaxis is a *so-called* preventive measure. The late J. C. McWalter at the Cambridge B.M.A. Meeting, 1920, exploded the doctrine that Quinine *prevented* malaria. Capt. Cecil Alport in "Malaria and Its Treatment" shows that the treatment at Salonika was a colossal and expensive failure. A good mosquito net is the best preventive.

Failure of prophylaxis with Quinine attributed to tablets which fail to disintegrate and which are voided intact. Tablets common on the Gold Coast which are incommoded neither by hitting with a hammer nor by keeping 3 years in dilute Hydrochloric Acid.—M. Blanchard, per T.D.B. 19/22,872.

The difficulty of getting natives to take Quinine prophylactically, or after discharge from hospital, overcome by issuing pink sugar-coated tablets, called 'Pink Tonic Tablets,' containing Quinine 2 grains, Reduced Iron ¾ grain, Arsenious Acid 1/50 grain, Extract Nux Vomica ⅛ grain. Effects beneficial and tablets readily taken.—U.F.C., '25,112.

Malaria during Pregnancy.

In the tropics one is frequently called upon to treat an attack of malaria in a pregnant patient. Experiments showed that Quinine in certain concentrations causes contraction of both the longitudinal and circular fibres of the uterus. 1 in 300,000 has no effect. 1 in 44,000 produces a tonic spasm which, if sustained, would cause asphyxia of the fœtus from constrictions of the placental sinus. This concentration could only occur if the patient was nearly poisoned with Quinine.

Therapeutically, as soon as malaria is diagnosed, which is a matter of urgency in pregnancy, give Quinine or Quinidine at once. Divide dosage into 2½ or 5 grain doses every 2 or 4 hours.—H. W. Acton, L. i./21,216.

The treatment of malaria in pregnant women.—J. Dhairyam, I.M.G., April '25,165.

Heavy doses of Quinine given in malaria during pregnancy, *e.g.*, 16 Gm. (*per os* and intramuscularly) in 7 days, and 31 Gm. in 17 days. Children born alive and well.—Adam, per Chininum, 134.

Malaria in England.

Fatal cases of æstivo-autumnal malarial fever in England.—A. J. Hall E. H. Williams and J. S. C. Douglas, L. i./18,734.

Treatment in England. Discussion of Quinine Dosage.—B.M.J. ii./19,744 ; see also Sir W. H. Willcox, *ibid.* 796, and L. ii./19,1105 ; Sir R. Ross, 863 ; T. H. Jamieson, L. ii. /19,266 ; S. P. James, *ibid.* 1016.

Antimalarial measures in England. Dangerous areas and Quinine prophyaxis.—A. Macdonald, B.M.J. i./19,669.

Anopheline Mosquitoes in Great Britain. Three species of Anopheles indigenous in Great Britain. Of these, two—*A. Maculipennis* and *A. Bifurcatus*—are known to be malaria carriers but in view of relative infrequency and many other factors, can hardly be viewed as a source of danger in spreading malaria. Of the millions of Anopheline mosquitoes bred in a locality only a few would be likely to bite a human being at all, fewer would be likely to bite an infected human being, fewer still would bite an infected person whose blood contained sexual parasites suitable for transmission into a mosquito.—B.M.J. ii./18,63. See also L. ii./18,151 and B.M.A. Discussion, B.M.J. i./19,490.

Fatal case of malignant tertian malaria contracted in North of England.—E. E. Glynn and J. C. Matthews, B.M.J. ii./20,811,871, T.D.B., Vol. 17, 1921/136.

In England Anopheles mosquito is not a danger, due to efficient sanitary service. Malaria used to be quite common in this country.—A. W. Alcock, L. ii./25,34.

General References to Malaria.

Malarial Commission, League of Nations, Conclusions. The thirtieth anniversary of the discovery by Sir Ronald Ross that *Anopheles* mosquitoes are hosts and carriers of the malarial parasite is just completed. One of the most important conclusions is that anti-malarial measures should be limited to reduce severity and as far as possible incidence. Each country must work out its own salvation. Quinine is not an effective prophylactic for new infections and relapses. The killing of adult *Anopheles* important and should be urged by educational propaganda. The study of malaria must be continuously pursued in the laboratory or the field.—Lt.-Col. S. P. James, Adviser on Trop. Dis., Min. of Health, B.M.J., ii./27,340.

Malarial fever is the *principal and gigantic ally of Barbarism.* What we call the Dark Continent should be called the Malarious Continent, and for centuries successive waves of civilisation have broken themselves in vain upon its shores.—Sir Ronald Ross, Chininum, 20.

The journey of the Malaria Commission of the League of Nations to Eastern Europe and Italy.—Chininum, 21—48.

The anti-malarial campaign during recent years—with specimens of pictorial posters as used in India, U.S.A., Dutch East Indies, Algeria, France, Roumania and Russia.—J. W. Van der Spek, Chininum, 145—172.

Italy 40 years ago formed one immense focus of malaria, but owing to continued efforts the officially infected zones now only occupy one-third of total. In the last resort, it is the well-being of the population which results in the transformation and disappearance of malaria.—L. Raynaud, per Chininum, 56.

Dr. Andrew Balfour estimates the direct annual cost of sickness and death attributable to malaria in the Empire at 250,000,000 dollars to 300,000,000 dollars, and the annual world death-roll at 2,000,000.—Jl. A.M.A., ii./25,1571.

Report of the Malarial Research Unit in Palestine.—Jl. A.M.A., ii./25,1084.

Malaria in Europe.—L. ii./25,25.

Ill Effects from Quinine.

Quinine amblyopia. 12 5-grain tablets of Quinine caused giddiness, nausea, vomiting and loss of sight within three hours. Recovery under Amyl Nitrite inhalation and Sodium Nitrite in 2 grain doses.—H. and R. Gainsborough, per Pres., Feb. 23, 75.

Quinine Hydrochloride, 39 grains in a malaria patient, caused severe vomiting, deafness and dilation of pupils. Total blindness for 7 weeks, after which for 2 months vision was restored, after which permanent blindness supervened. Possibly due to the effects of Alcohol and tobacco on the nerve fibres and ganglion cells.—J. S. Du Toit, per T.D.B. 19/22,710.

Quinine Blindness caused by 20 Gm. Stomach lavage, enemata, etc. Central vision reappeared after 15 days, but peripheral vision and vision for colours returned more slowly.—Pres., Jan., 1913,203.

60 grains of quinine in hot whisky and water caused delirium and collapse. An enema of hot coffee, strychnine and digitalin hypodermically, and hot bottles produced rapid improvement. The quinine acted as depressant to the respiratory and cardiac systems.—H. Gooch, B.M.J. ii./26,115.

Deafness.—All perception of light lost and deafness caused by quinine sulphate 30 grains, lasting for months.—F. C. Plummer, B.M.J. ii./25,1062.

Quinine over lengthy periods will produce deafness.—A. S. Gubb, B.M.J. i./20,131.

Death from 48 5-grain Quinine Bisulphate Tablets.—H. M. Raven, B.M.J., ii./27,59.

Urticaria following Quinine treatment of malaria. One cured by injections of Adrenalin and the other by Calcium Lactate *per os.*—Maj. T. A. Hughes, I.M.G., Jan. '26,7.

Acute cinchonism produced by Quinine Sulphate ; 200 grains taken during 72 hours, together with a like amount of Potassium Bromide.—G. P. Adshead, Jl. R.N.M.S., Apl. '26,145.

***Plasmochin** (T.M. 466698). An Alkyl-aminoquinoline derivative very slightly soluble in water.

In benign tertian malaria infections a dose of 0·08 Gm. daily for 5 days caused rapid disappearance of parasites with very rapid reduction in size of spleen. In subtertian malaria crescents disappeared within 4 days, but parasitic relapses likely to occur, and cyanosis may develop. Better results obtained by combining with Quinine called **Plasmochin Compound** (each tablet containing Plasmochin 0·01 Gm. and Quinine Sulphate 0·125 Gm.). Regarded as the first of a new series of anti-malarial synthetic drugs and not as a climax. Hopeful as regards synthesis of still more efficient anti-malarial compounds.—P. Manson-Bahr, L. i./27,664. Rapid in action on crescents of subtertian malaria, which disappear from the circulation in 3 days after 0·24 Gm.—B.M.J. ii./27,344. (*Caution as to this dose— v. infra.*)

Used for treatment of general paralytics artificially infected with malaria, also on actual malaria cases. Results in Italy satisfactory. Hæmoglobin content of the blood increased. Also used in conjunction with Quinine.—B.M.J., ii./26,798.

Plasmochin is not efficacious as a prophylactic and when the dose is pressed beyond 0·1 Gm. cyanosis may occur. It seems that children and infants take it without danger.—L. ii./26,825.

1 Cc. of 1 in 50,000 solution in canaries daily for 6 days delays development of plasmodium as well as Quinine 1 in 800. Larger doses are spoken of in conjunction with Quinine. Blackwater fever also satisfactorily treated. Prophylactically in malaria.—L. ii./26,1279.

Four cases of toxic symptoms after 0·06 Gm. in 24 hours. Cyanosis and abdominal pain.—H. C. Squires, L. i./28,673.

Discussion on dosage.—L. i./28,87,160.

RESORCINUM (*B.P.* '14).

Syn. **Resorcinol,** $C_6H_4(OH)_2$=110·048. *Dose.*—1 to 5 grains **(0·06 to 0·3 Gm.).**

Metadihydroxybenzene is in white crystalline plates, melts at 230° F. (=110° C.) and is easily volatilised. Preserve from light.

Manufacture.—Benzol-Disulphonic Acid is prepared by heating Benzol with fuming Sulphuric Acid and the liquor poured into water to which Milk of Lime is added. The solution is filtered and the filtrate treated with Sodium Carbonate. It is again filtered and the filtrate evaporated and afterwards fused with Sodium Hydrate. The melt is cooled and dissolved in water, acidified with Hydrochloric Acid and, after boiling off the Sulphur Dioxide and filtering off tarry matter, is extracted with Ether and then recrystallised from Benzol.

For a more detailed account see Edition 17, Vol. I, p. 681.

Soluble 1 in 1 of water, 2 in 1 of alcohol, 1 in 20 of olive oil.

Incompatible with spirit of Nitrous Ether, and with caustic alkalis.

Uses.—Resorcin has useful antiseptic properties. It coagulates albumin, and has a caustic action on the skin, but a 2% solution is not irritating. It is an effective topical remedy in diphtheria, and produces no injurious consequences. A 5% solution may be injected into the bladder without causing any irritation, and is useful in inflammatory affections of this organ, likewise in vesical catarrh after gonorrhœa; 5 to 10% solution is of service also in syphilitic sores and skin diseases; and a 1% solution improves unhealthy wounds, and is useful as an eye lotion in conjunctivitis. Given internally, but with great care, it has been used as an antipyretic but it cannot be recommended, if so given it must be well diluted with water and should be flavoured with syrup of orange or glycerin. In whooping cough, 10 minims of 2% solution or this strength used as spray is of service, as also in hay fever.

Epithelioma and rodent ulcer have been treated with ointments and plaster up to 30% strength. It is applied locally to condylomata and mucous patches. A pigment of 10% relieves irritation of tubercle of larynx. For eczema and alopecia, cold cream with 2% of resorcin is useful. In the form of paste it has proved useful in ichthyosis—favours desquamation and removes effete horny layer.

In gastric ulcer 2 to 5 grain doses have antiseptic action.

Resorcin externally proved fatal. A boy of 16 suffering from extensive lupus treated with a paste containing 25 to 30% Resorcin in Gelanthum. Patient became unconscious, cyanosed and motionless with tongue swollen and fixed between jaws. Camphor, venesection, etc., of no avail. Resorcin dangerous over large surfaces.—B.M.J.E. i./15,33.

Tablets, 3 grains (0·2 Gm.). *Dose.*—1 to 3.

Glycerinum Resorcin, G.H.

Resorcin 4, Distilled Water 4, Glycerin to 15.

In chronic urethritis resisting treatment, a single injection (25% resorcin) in fresh cases has been found beneficial.

Lotio Resorcini. *Syn.* SPIRITUS CAPILLARIS.

Resorcin 1, Ether 1, Castor Oil 1, Eau de Cologne 10, Alcohol (90%) 35. Useful for dandruff and alopecia. *Soap and alkali must be removed before use, or hair may be discoloured.*

Lotio Resorcin et Acidi Salicylici.

Salicylic Acid 30 grains, Resorcin 1 drachm, Spirit of Rosemary 1 ounce, Saponin 1 drachm, Lanolin 1 ounce, Aqua Mellis to 10 ounces. Dissolve the Salicylic Acid and Resorcin in the Spirit of Rosemary, melt the Lanolin, add the Saponin dissolved in a little water, place in a warmed mortar, add the Spirituous Solution just mentioned and the Aqua Mellis in parts to make a cream.

Lotio Resorcini Composita, St. M.'s H.

Resorcin 10 grains, Methylated Spirit 1 drachm, Water to 1 ounce.

Lotio Capillaris.—A stimulant to the growth of hair. Resorcin 5, Capsicum Tincture 15, Otto of Rose *q.s.* Castor Oil 10, Alcohol 90% to 100.

Ⓟ**Lotio Excitans, St. G. H.** For the scalp.

Resorcin 5 grains, Mercuric Chloride ½ grain, Glacial Acetic Acid 3 minims, Chloral Hydrate 10 grains, Cantharides Tincture 20 minims, Alcohol 60% to 1 ounce.

Ⓟ St. J. H. has Mercuric Chloride 10 grains, Glacial Acetic Acid 30 grains, Chloral Hydrate 3 drachms, Tincture of Cantharides 1 ounce, Alcohol 60% to 1 pint.

Ⓟ **Lotio Resorcini Pilocarpinæ et Cantharidis.**

Resorcin 80 grains, Pilocarpine Hydrochloride 15 grains, Cantharides Tincture 1½ ounces, Tincture of Capsicum 4 drachms, Spirit of Camphor 6 drachms, Castor oil 10 to 60 minims, Oil of lavender 30 minims, Alcohol 90% to 8 ounces. A useful stimulating lotion in alopecia prematura for use after exfoliative treatment

Lotio Resorcini et Acidi Borici.

Resorcin 1, Compound Tincture of Lavender 10, Glycerin 10, Saturated Solution of Boric Acid 80, as a mouth wash.

Nebula Resorcini.—For a cold, spray nostrils with 1% solution.

Gargarisma Resorcin E.L.

Resorcin 15 grains, Glycerin 1 drachm, Water to 1 ounce.

Unguentum Resorcini, R.O.H. Resorcin 2, Soft Paraffin to 100.

Unguentum Resorcini Compositum. **Ihle's Paste,** St. J. H.

Resorcin, Zinc Oxide, Starch, of each 5% approx. in Soft Paraffin. Has been used stronger for bromide acne.

Resorcin liquefies with Menthol, Camphor or Phenol, and a small amount of any of these may well be added so as to form a uniform ointment.

Unguentum Resorcin et Acidi Salicylici. *Syn.* CASTELLANI'S OINTMENT.

Resorcin 60 grains, Salicylic Acid 10 grains, Lanolin and Soft Paraffin to 1 ounce.

The most popular remedy for Dhobie itch in Africa and Asia.

Pasta Resorcini Fortior (Lassar and St. M.'s H.).

Resorcin 20, Zinc Oxide 20, Starch 20, Liquid Paraffin 40. '**Mitis**' 10, 25, 25, and 40 respectively.

Pasta Resorcini et Zinci Oxidi, K.C.H.

Resorcin 1, Glycerin 1, Zinc Oxide 1, Paraffin Ointment (white) to 8.

Baculum Resorcini.—Resorcin 3, Wax 2, Lanolin 5.

Resorcin Monacetate. *Syn.* ✱**Euresol** (T.M. 355476).

Manufacture.—Mix Resorcin 440 and Acetyl Chloride 320 and allow to interact completely in an open dish. Then heat to 100° C. for ½ hour. Cool, wash free from acid with water, and dry over exsiccated Sodium Carbonate.

A honey-like mass. Dissolves 10 to 30% in acetone, for use in acne, seborrhœa and sycosis. **Euresol pro Capillis** is the same perfumed. It is directed to be made into a Hair Lotion by mixing 2 parts with Alcohol 70%, 32 and Water to 48. Removes dandruff and itching.

Thio-resorcin. Yellowish powder slightly soluble in alcohol; as a substitute for Iodoform; 5% Ointment in skin diseases.

Hexyl-Resorcin. *Syn.* ✱CAPROKOL (T.M. 460019).

1 : 3 DIHYDROXY-4-HEXYLBENZOL, $C_6H_3(OH)_2.(CH_2)_5.CH_3.=$ 194·144.

Dose.—2 to 10 grains (**0·12 to 0·6 Gm.**) thrice daily.

Patents.—The following Patents relating to the manufacture of Hexyl-Resorcinol and allied compounds were granted to Sharpe and Dohme (Baltimore): Patents 219922 of 1923, 224913 of 1924, and 250892, 250893 of 1925, relate to the manufacture of the Alkyl Resorcinols, and 223190 of 1923 to the production of Aralkyl Resorcinols.

In June, 1927, Sharpe and Dohme brought an action against Boots Pure Drug Co. for infringement of Patent rights (No. 219922). The action was dismissed, Mr. Justice Astbury holding that the Patent was invalid for want of subject matter. Liberty to apply was given to plaintiffs with regard to the granting of a certificate as to validity, and for leave to amend the specification.

The plaintiffs' Counsel based their case primarily on the fact that all the bodies claimed in the specification were in fact new bodies and had never been previously known or prepared, and they coupled this with the fact that these compounds have high therapeutic value and that these facts were sufficient to establish validity of the Patent. With this Mr. Justice Astbury entirely disagreed.

The appeal was dismissed with costs.—March 11, 28. P.J. i./28,259.

The compound is a stable one, forming white crystals, M.pt. 65° C., soluble in water 1 in 1,700, readily in Ether, Chloroform and Alcohol, and in oils.

Uses.—One of the most powerful germicides known, the Phenol Coefficient ranging from 46-52. The bactericidal power is retained in either acid or alkaline urine even in high dilution. Given by the mouth, the compound is secreted in the urine at a rate producing continuous local bactericidal action in the urinary tract. Chronic *B. coli* infections and Staphylococcus infections have been treated with it, but it acts best in early cases. Pyelitis and cystitis caused by organisms other than *B. coli* are cleared up in a few weeks. *B. coli* infections require, on the average, about as many months. It is of value in disinfection of wounds draining the urinary tract, and tuberculosis of the urinary tract.

Gelatin Capsules containing 0·15 Gm. in 25% Olive Oil Solution are taken *immediately after* each meal thrice daily, three to four being taken on each occasion; they must not be taken on an empty stomach. *B. coli* infection may need 60 to 90 days' continuous treatment.

Caprokol Solution *for children* is made, each drachm containing 0·1 Gm. in 2½% solution in Olive Oil.

In the preliminary experiments a total of 45 Gm. produced no toxic symptoms, but since then much larger amounts have been given without toxic effects. Urinary tract infections due to *Staphylococcus albus*, *Staphylococcus aureus*, *Streptococci*, some strains of *B. pyocyaneus* and *B. coli* have been cleared up with Hexyl-Resorcin alone by mouth.—V. Leonard, Jl. A.M.A., Dec. 20, 1924.

Daily oral administration to rabbits of 0·5 Gm. for 21 consecutive days, and of single doses as large as 2·5 Gm., resulted in no toxic effects. It is probable that the bactericidal power is due to its being a very powerful surface tension reducent. Hence, administration of Sodium Bicarbonate is contra-indicated and the forcing of fluids must be avoided, as they both increase the surface tension of the urine and rob the compound of bactericidal action. So far as is known, nephritis is not a contraindication. A dose of not less than 0·45 to 0·6 Gm. (three to four capsules after each meal) three times a day is required. For infants and children, the solution in Olive Oil mentioned has been found satisfactory: children seem to tolerate relatively larger doses than adults.—V. Leonard and A. Wood, Jl. A.M.A., ii./25,1855—59.

Of 3 cases of chronic *B. coli* infection treated by courses of 200—400 capsules one showed little improvement while the others obtained relief of symptoms and sterilisation of the urinary tract.—B.M.J.E., i./26,103.

PYELITIS: Successful in only 1 case out of 14.—Am. Jl. Dis. Child., Sept. 26, per Jl. A.M.A., ii./26,1506.

PYELONEPHRITIS, CHRONIC: Two or three capsules thrice daily for 2 months improved symptoms and reduced pus in urine, but did not eradicate infection. —W. F. Braasch and E. P. Cathcart, Jl. A.M.A., i./27,1632.

Given alone in the treatment of upper urinary tract infections, the foci of infection and all types of obstruction having been removed, it will cure about one-third of cases, with an additional 20% of symptomatic cures: about 43% will be improved, and 25% remain unchanged. Gives rapid and continued relief of symptoms in all but one-fourth of cases. The earlier the treatment the better the chance of cure—the average duration of symptoms in cured cases is 9½ months, while in improved cases it is 23 months. Coccus infections respond more certainly than bacillus or mixed infections. A higher proportion of cures is likely if the treatment were combined with other methods. Details of treatment of 82 cases of acute and chronic pyelitis and prostatitis. —C. W. Eberbach and R. D. Arn, Jl. A.M.A., Aug. 14, '27,514.

Test for Hexyl-Resorcinol in body fluids.—D. C. Elliott and H. G. Barbour, Can. Med. Assn. Jl., Aug. '25,787, per Pres., Jan. '26,49.

TISSUE DISINFECTANT.—Hexyl-Resorcinol is claimed to be effective when 0·1 Gm. is dissolved in Glycerin 30 and Water 70 Cc., and pathogenic micro-organisms are stated to be destroyed in less than 15 seconds. Undiluted the solution may be used for lavage of the urethra, bladder, and buccal mucous membranes, and mixed with 2 vols. of water it may be instilled into the normal conjunctival sac.—B.M.J.E., ii./27,100.

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* SACCHARIN (T.M. 392328; see also 332891).

Glusidum (*B.P.* '14) U.S. X., Ph. Ned. V. *Syn.*—GLUCUSIMIDE, *Saxin (T.M., 198,971) BENZOYL SULPHONIC IMIDE. BENZOSULPHINIDUM. $C_6H_4 : SO_2CO : NH = 183{\cdot}112$.

Dose.—½ to 2 grains (0·03 to 0·12 Gm.) or more.

A derivative of toluol in white, intensely sweet, crystalline powder. Its aqueous solution has an acid reaction; it forms crystalline sweet salts with alkaloids and metallic bases. Solutions of alkalis and their carbonates dissolve it, forming compounds.

Soluble 1 in 400 of water, in alcohol 90% 1 in 38, in ether 1 in 100, incompletely in chloroform, and in glycerin about 1 in 50, slightly in oils and fat, also in acetone.

Use.—Instead of sugar for diabetic and obese patients.

Saccharin (insoluble) is sold in sweetening powers 300, 450 and 550—the above remarks refer to "550."

Influence of Saccharin on the catalases of the blood.—Some of the recent work on Saccharin has had a tendency to ascribe to this compound an action beneficial to the processes of oxidation in the blood, particularly in diabetes. F. C. Becht finds there is no evidence that it produces any change in the catalytic power either in the positive or the negative direction *per os.* 4 Gm. per kilo is a powerful gastro-intestinal irritant. Given intravenously it produces a marked decrease in the catalase content of the blood. There is no difference from the normal in the case of an animal with pancreatic diabetes.—Jl. Pharm. & Exp. Therap., Oct. 1920.

Glusidum Solubile, U.S. X. $C_6H_4.SO_2CO.NNa.2H_2O = 241{\cdot}133$. *Syn.* **Saccharinum Solubile,** P.G. VI. contains about 90% of Saccharin in combination with soda. In yellowish granular, micro-crystalline masses, easily soluble in water, and therefore convienient for flavouring purposes. 1 in 2,000 or 2 grains to an 8-ounce mixture is sufficient.

Dose.—½ to 2 grains (0·03 to 0·12 Gm.) or more.

Elixir Glusidi, B.P.C.—*Syn.* **Elixir of Saccharin.** *Dose.*—5 to 20 minims. Gluside 5, Sodium Bicarbonate 3, Alcohol 12·5, Distilled Water *q.s.* to 100. 1% added to mixtures for flavouring.

Saccharin Tablets. Contain ½ grain with Sodium Bicarbonate *q.s.*

Dulcin. *p*-PHENETOLCARBAMIDE, P.G. VI.

$C_2H_5.OC_2H_5.NH.CONH_2 = 180{\cdot}112$.

Dose.—Tablets are made containing ¾ grain (0·05 Gm.).

White crystalline powder, M.pt. 172-174° C. Slightly soluble in water, readily in Alcohol. Can be boiled. Used as a substitute for sugar, and stated to be innocuous.

SACCHARUM PURIFICATUM.

Syn. SACCHAROSE, SUCROSE. $C_{12}H_{22}O_{11} = 342{\cdot}176$.

Crystals or powder, soluble 2 in 1 of water.

In addition to the Refined Sugar obtained from the juice of the Sugar Cane—*Saccharum officinarum* (*Graminaceæ*)—various grades of granular cane and beet sugar both with and without the addition of "blue" are marketed. For the manufacture of Syrups a sugar without the colouring matter is essential. *B.P.* '14 and U.S. allow also beet sugar.

Sugar Beet Industry.

The **British Sugar (Subsidy) Act, 1925**, provides for the grant of a subsidy for the period of ten years (1924-1934) on sugar and molasses manufactured from home-grown beet.

The Subsidy rates are:

	If manufactured between 30th Sept., 1924 and 1st Oct., 1928.	If manufactured between 30th Sept., 1928 and 1st Oct., 1931.	If manufactured between 30th Sept., 1931 and 1st. Oct., 1934.
	£ s. d.	£ s. d.	£ s. d.
Sugar (exceeding 98° polarity)	0 19 6 cwt.	0 13 0 cwt.	0 6 6 cwt.
Molasses (if containing less than 70 and more than 50% of sweetening matter)	8 18 2 ton	5 18 10 ton	2 19 4 ton

These rates vary according to scale for sugar of differing polarisation and for molasses containing more than 70% or less than 50%.

All sugar and molasses produced are subject to Excise Duty: the rates for the examples quoted are 7/4⅔d. a cwt. for sugar (exceeding 98° polarisation) and 3/4⅔d. for molasses (50/70% sweetening matter).

Manufacturers paid for beets grown in 1924, 1925, 1926 or 1927 a minimum of 44/– per ton based on a sugar content of the beet of 15½%. An addition or deduction of 3d. per ton is made in respect of each 1/10% of sugar above or below 15½%.

In the case of any new factory constructed since the Act, it is a condition of payment of subsidy that ***not less than 75% of the plant and machinery installed shall be of British manufacture*** unless the Minister of Agriculture dispenses with this condition.

The Act may be obtained through any bookseller or from H.M. Stationary Office, Kingsway, London, W.C. 2, 3d.

The following summarises the general results:—

	Manufacturing Season.		
	1924–25.	1925–26.	1926–27
Acreage under sugar beet	22,637	56,243	129,463
Average yield of washed and topped beet per acre (tons)	8·10	7·67	8·63
Number of factories	3	9	14
Number of workers employed	—	4,613	7,194
Tonnage of beets delivered to factories	183,713	431,185	1,117,072
Average sugar content	16·65%	16·36%	17·31%
Average price per ton of beet	52s. 4d.	55s. 6d.	59s. 5¾d.
Total production of sugar (cwt.)	478,308	1,035,672	3,069,757
Average extraction of sugar	13·02%	12·01%	13·83%
Average farm output of sucrose per acre of beet	3,027 lbs.	2,809 lbs.	3,346 lbs.
Average factory output of sugar per acre of beet grown	2,367 lbs.	2,063 lbs.	2,656 lbs.
Molasses produced (cwt.)	114,015	270,910	753,254
Subsidy Paid.			
Sugar	£465,799	£1,009,019	£2,990,973
Molasses	£43,401	£112,562	£334,420
TOTAL	£509,200	£1,121,581	£3,325,393

For the season 1927-28 there were 19 factories working, while the estimated minimum production of sugar was 220,000 tons and molasses, 60,000 tons. The area under sugar beet in Great Britain, as returned on the 4th June, 1927, was 230,066 acres. This figure is provisional.

The Ministry of Agriculture and Fisheries who kindly supplied the above data, publishes monthly figures of sugar production in its Weekly Agricultural Market Report and monthly Journal. (H.M. Stationary Office, 2d. and 6d. net, respectively.)

There was a poor yield from the 1927 crop, viz., 6½ tons per acre, owing to bad climatic conditions.

In **Leaflet No. 203** of the Ministry it is pointed out that the English climate is exceptionably favourable for sugar-beet growing. The ideal soil is a deep friable easy-working loam, free from stone, well-drained. An acid or sour soil suffering from marked shortage of lime and presence of excess of organic matter is unsuited. Beet can be substituted for mangolds or swedes in rotation. At least 15 lbs. of seed per acre are required to be sown under the factory contracts. Hoeing and singling are important. After harvesting, the sugar-beet tops may be ploughed in or ensilage resorted to. See also *Sugar Beet from Field to Factory*, and *Sugar Beet and Beet Sugar* by R. N. Dowling (E. Benn., Ltd.).

Beet Sugar Industry in N. France.—An interesting and exact account of sugar preparation.—W. A. Poucher, P.J. i./17,467.

How the Plant makes Sugar—a book giving a comprehensive account of the whole subject of sugar.—G. Fairrie, Liverpool, Fairrie & Co., 1925, abst., L. i./26,584.

Relative Sweetness of Sugars.—If the sweetness of Sucrose is rated as 100, Levulose deserves a value of 173, Glucose 74, Maltose 32, Galactose 32, and Lactose (Milk Sugar) 16.—Jl. A.M.A., ii./25,977.

For the Estimation of Sugar by means of Polariscope and other Methods see Vol. II.

Uses.—In heart disease, as also in cancer and phthisis, large amounts are of service. It is changed into glycogen and thence to glucose in the system. It has been given ***intravenously*** as strong as a 50% solution but an isotonic solution (10·3%) would appear preferable. It is added to Infants' foods made of dried milk.

Sugar with caraway infusion is used to hasten and increase mammary flow in Egypt, as well as to bring about a speedy involution of the uterus. Suggested in such cases as sub-involution, when the administration of drugs may have some retarding effect on the mammary secretion.—B.M.J. i./12,14

In various morbid conditions, anæmia, adynamic varieties of rheumatism, in neurasthenic manifestations of neurotic persons, Cane Sugar is beneficial —¼ lb. to ½ lb. for an adult to be slowly eaten daily and a lump or two at odd times through the day or night, but not just before a meal.—B.M.J.i./11,753.

CARDIOLOGY.—Recent gains in treatment. Many cases of incipient rheumatic endocarditis may be prevented from passing into permanent valvular disease by prolonged rest, the administration of Sodium Iodide and application of blisters.—Caton. Chronic heart failure aided by Cane Sugar.—W. Gordon, B.M.J. i./21,13.

ECZEMA, PSORIASIS AND PRURIGO well treated by intramuscular injection of 2 or 5 Cc. of an 8% solution of Saccharose.—Per Jl. A.M.A., ii./25,1999.

Arthritis. Tolerance for sugar is often diminished.—Pringle and Miller, M.P.C. 31/23,85.

Syrupus (*B.P.* '14).

Sugar 1, Water to 1½ by weight, Sp. Gr. 1·33. U.S. X. orders Sugar 85, Water to measure 100. Weaker strengths of syrup do not keep well. Potassium Carbonate 1 grain in 12 ounces of Syrup has been found to prevent crystallisation.

A few drops of Chloroform per ounce of Syrup will prevent fermentation.—C. D., Aug. 22, 1922, p. 310.

Invert Sugar is prepared by action of dilute mineral acid on Cane Sugar. Consists of a mixture, possibly a loose combination, of equal weights of Grape Sugar (Dextrose) and Lævulose. A useful substitute for cane sugar in dyspepsia—more easily borne in gastritis.

Invert Sugar forms in simple syrup on keeping—that made by cold process produces more than hot. In 18 months it may reach 6%.—P J. ii./16,545.

Lævulose.—*Syn.* Diabetin, Fructose.

$C_6H_{12}O_6$ = 180·066.

A whitish crystalline lævorotatory powder (also honey consistence), freely soluble in water, reduces Fehling's Solution.

Manufacture.—May be prepared by hydrolysis of cane sugar on the following lines:—Heat cane sugar 300 dissolved in water 1,200 with addition of Hydrochloric Acid 7 at 70° C for two hours or until hydrolysis is complete. Dilute with further addition of water to 3,000. Add slaked lime 200. Stir until reaction complete and add ice 700 or *q.s.* and stir until the lævulosate throws out. (The glucosate remains in solution with adequate cooling.) Filter, press the precipitate and decompose the latter with Oxalic Acid. Filter and evaporate the filtrate to a syrup. The evaporation must be done *in vacuo*. This syrup will crystallise in time.

Pure Inulin from dahlia bulbs or chicory root which contain 6 to 12% is also suitable for producing pure Lævulose.

Prepare an 18 to 20% solution of it in ½% Sulphuric Acid and warm this on a boiling water bath for an hour. Neutralise the liquor with calcium carbonate, filter and evaporate the filtrate at a *low* heat to a syrup. Introduce a few crystals of lævulose and stand over sulphuric acid. A crystalline mass of Lævulose will form. Press between porous plates and recrystallise from absolute alcohol employing here also a few crystals of Lævulose as nidus.—Schmidt.

A stronger sweetening agent than cane sugar; has a pleasant flavor. Specially suitable for diabetics.

The use of **Jerusalem Artichokes** for six months proved beneficial in diabetics, who were able to increase the other constituents of their diet and gain weight, with only slight addition to the Insulin dosage, due apparently to slow absorption of Lævulose. A definite increase in blood sugar followed but less than that produced by an equivalent amount of Lævulose. Baked artichokes raised the respiratory quotient in all cases.—per Jl. A.M.A. ii./25,544.

The uses of Lævulose.—Pres., July, '26,279.

Lævulose test for liver efficiency. All ordinary sugars, glucose, cane sugar, etc., when ingested, raise the concentration of sugar in the blood, but not lævulose. Thus, with 50 Gm. of glucose, the blood sugar concentration is increased in the first half hour from the usual 0·1 to 0·16 or 0·17%, returning to normal in about 1½ hours. There is no rise with lævulose. This lack of power on the part of lævulose depends on an intact liver. If there is a definite lesion of the liver, lævulose acts, more or less, like glucose *i.e.* there is a marked increase in blood sugar.—J. C. Spence and P. C. Brett, L.ii./21,1362; B.M.J. ii./22,1061. See also Prof. Maclean, *ibid.* 1060.

The Lævulose Test showed consistent results in 53 cases. Of considerable value as index of functional capacity of liver. Lævulose 45 Gm. in water 100 Cc. is given *per os* and the blood sugar determined at half-hourly intervals for 2 hours and compared with sample taken before injection of sugar.—G. King, L. i./27,388.

Galactose test for liver efficiency. Give 40 Gm. in 400 Cc. water to the fasting patient and collect samples of venous blood, at half-hourly intervals for 2 or 3 hours. There is no great rise in blood sugar curve, except where hepatic cells are grossly damaged. Thus normal persons, or those with gross obstructive jaundice, or pernicious anæmia and alcoholic jaundice, show little or no rise of blood sugar, but in those with catarrhal or toxic jaundice, with malignant disease with secondary deposits in the liver, and with cirrhosis following syphilis or alcoholism, Galactose causes definite increase in blood sugar.—D. T. Davies, L. i./27,380.

Identification of Inulin and Maltose by a mycological method. Tables and formulæ.—A. Castellani and F. E. Taylor, Jl. Trop. Med., Feb. 15/23,59.

Saccharosan and Glucosan.

It has been suggested to modify Saccharose and Glucose by heat to produce carbohydrates ('Anhydro-Sugars') which can be given to diabetic patients without their affecting blood or urinary Glucose. The writer has prepared both the compounds for trial.

Animal experiments showed that Glucosan given by the mouth caused no change in the respiratory quotient and it was absorbed to the extent of only 30%, the absorbed fraction being excreted unchanged in the urine. It is unlikely therefore that the substance can be profitably included in the diet of diabetics.—B.C.A., '26,A973.

Glucosone. utilisation by the diabetic.

A very impure syrup, containing chiefly Glucosone, was prepared by treating Lævulose with Hydrogen Peroxide in presence of Iron, and was shown to be completely utilised in severe cases of diabetes. The sugar excretion was not increased, Acetone substances completely disappeared, the urine became alkaline, and alveolar Carbon Dioxide tension increased. Glucosone forms Glycogen even more readily than Lævulose. Not recommended for therapeutic use until obtainable in pure form.—B.C.A., '26, A.317. (See also J.C.S., A.i., 1888,1267, for Glucosone.)

SANTONINUM.

Dose.—1 to 3 grains (0·06 to 0·2 Gm.) in sugar. U.S. X. *Average dose.*—1 grain. Fr. Cx. : *Max. single dose*, 1½ grains; max. during 24 hours, 5 grains approximately. Slipule No. 5 holds 2 grains.

A neutral crystalline principle. The inner anhydride, or lactone of Santonic Acid, $C_{15}H_{18}O_3$=246·144, obtained from Santonica, the dried flower-heads of *Artemisia maritima var. Stechmanniana* (*Compositæ*). *Syn.*—Levant Wormseed, *Flores Cinæ* (*Cynæ*)—P.G., Wurmsamen. Ormesukker (Danish) is a Confection of Santonica.

Artemisia brevifolia (Wallich) found to contain about 1% Santonin, It occurs from Kashmir to Kumaon at 7,000 to 9,000 ft. altitude.—Prof. Greenish, P.J. i./21,2.

A. Mexicana and other species contained none.—Prof. H. G. Greenish and Constance E. Pearson, P.J. ii./22,85.

Further notes on the leaves, root, stem and flowering tops of *A. Brevifolia* as a source of Santonin.—Prof. Greenish and C. W. Maplethorpe, B.P. Conf. 1923; P.J. ii./23,94.

The powdered flowers of a variety of *Artemisia Maritima*, growing in the Himalayas, form an excellent substitute for the expensive (Russian origin) Santonin.—L. i./23,808.

The examination of true and false Santonicas.—T. E. Wallis and E. J. Mowat, P.J. ii./25,149.

Soluble 1 in 40 Alcohol 90% and in Oils (1 in 200 of Castor Oil). in Chloroform 1 in 3. Also in Caustic Soda Solution. Insoluble in water. Turns yellow in sunlight.

P.G.VI. gives a test for the presence of foreign organic matter, alkaloids and Artemisin in Santonin.

Uses.—It is an anthelmintic for round (*Lumbrici*) and threadworms (*Ascarides*), but is inoperative against tapeworm (*Tænia*). It colours the urine orange, and in too large a dose may cause objects to appear of a green or yellow colour. A greenish yellow or saffron colour may be produced in the urine, and if the urine be alkaline a purplish red. It relieves the lightning pains of tabes dorsalis. Hare recommends that immediately after taking a dose of Santonin a 2 or 3 grain dose of Calomel is to be given, followed by a saline purge six hours afterwards, the flow of bile being particularly useful in making the worm let go its hold. In urinary incontinence Santonin will often effect a cure. It has been advised for use in diabetes.

'Golden' Santonin has been used in sprue and dysentery.

As an anthelmintic it is very active in an oily solution, *e.g.*, **Haustus Santonini et Olei Ricini**, Santonin in powder 4 grains, Castor Oil 3 drachms. Mix and emulsify with Mucilage of Acacia 4 drachms, Syrup 1 drachm, Peppermint Water to 1½ ounces. Saccharin ½ grain added is an improvement. Taken fasting in the morning makes a dose for a child of 6 to 12 years, *but caution.* ***Poisoning has occurred by Santonin given in oily solution.*** Given in powder it is not absorbed and consequently is non-toxic though acting equally well on the parasites. The usual custom is to give the Santonin in powder on two or three nights, following by Castor Oil *in the morning.*

Santonin poisoning by ½ grain. This dose in two drachms of Castor Oil brought away from a five-year-old girl a large number of thread worms and a few round worms, but the child became weak and looked like dying.

After three weeks recovered, but was completely blind and remained so for three months.—L. ii./10,1693.

DIABETES.—Santonin is stated to cause diminution in the amount of sugar eliminated. It appears to act as a sort of digestive (épargne), increasing the power of assimilating Carbohydrates. Course of treatment extends over six weeks, followed by a week or two weeks interval, then continue until disappearance of glucose. A French speciality of this kind contains in addition a tonic balsam and liver stimulant.

Diabetic gangrene well treated by systematic dosing with Santonin. Pills containing ¾ grain (0·05 Gm.) *t.d.s.* increased until an amount of 5 grains (0·3 Gm.) *per diem* is given.—Ind. & East. Drug., Mar. '24,63.

Pills and Tablets, ⅓, ½, 1, 2 and 3 grains. *Dose.*—As Santonin.

Confectio Santonini Composita. E.L.

Dose.—1 drachm for a child 2 to 5 years.

Santonin 1, Powdered Ginger 1, Jalap 3, Sulphur 4, Senna Confection 51.

Pulvis Santonini Compositus, GT. ORM. H.

Santonin 1½ grains, Compound Scammony Powder 2 grains, Calomel ½ grain. Castor Oil or a saline next morning.

Trochisci Santonini. (*B.P.* '14) 1 grain (0·06 Gm.) in each; one every night for a few nights then an early morning aperient.

Suppositorium Santonini contains 3 grains (0·2 Gm.) or more. Should be inserted every 2nd or 3rd night, for three times.

Golden Santonin. *Syn.* CHROMO-SANTONIN

Dose.—2 to 5 grains (0·12 to 0·3 Gm.).

A modification of ordinary Santonin formed by exposure to sunlight.

ENTERIC is stated to have been usefully treated, also a type of 'sprue' (3 grain doses morning and evening in oil), and dysentery.

Sodii Santoninas. $NaC_{15}H_{19}O_4.3\frac{1}{2}H_2O = 349{\cdot}205$.

Dose.—¼ to 1 grain (0·016 to 0·06 Gm.) for adults. White crystals. Should in preference be given in Salol-coated pills or stearettes.

Note.—Santoninic Acid is to be carefully distinguished from Santonic Acid. The former can be made as Sodium Salt by heating Santonin with finely powdered Crystalline Sodium Carbonate. in dilute spirit with reflux condenser. Santonic Acid as Barium Salt is formed when Santonin is added to hot saturated Baryta water. *Sodium Santonate* has *dose* 1½ to 6 grains (0·1 to 0·4 Gm.).

The activity of Santonin is associated with a lactone ring, the Sodium Salt of the corresponding acid being inactive. This is difficult to reconcile with the existing use of Sodium and other salts of Santoninic acid as anthelmintics but the Sodium Salt is not greatly used now owing to toxicity.—T. A. Henry, P.J. i./23,28.

SANTONIN-SODIUM INJECTIONS subcutaneously, intramuscularly and intravenously for ascarides, the dose being usually 0·1 Gm. in 10% solution, one to three injections being given. Except in five of the 40 cases, the worms were expelled dead, though no laxative was given. Only two cases, which received 0·2 Gm. at a dose, showed signs of toxic effects.—Jl. Orient. Med., July '26, per Pres., '27,39.

SAPONES.

Sapo Animalis or Curd Soap is mainly Sodium Stearate. **Sapo Durus** or Castile Soap is mainly Sodium Oleate. **Sapo Mollis** (all are *B.P.* '14) *Syn.* Sapo Viridis is mainly Potassium Oleate (made with Olive Oil; U.S. Linseed Oil).

Sapo Medicatus, P.G. VI. is prepared by warming Sodium Hydroxide Solution (15% strength) 120, on the water bath and adding in portions Melted Lard 50 and Olive Oil 50 mixed and heating ½ hour with stirring. Then add Alcohol (90%) 12 and when homogeneous, gradually Water 200 and heat if necessary, adding a little more Alkali until saponified and a sample is soluble in water without precipitation of fatty matter. Filter and add Sodium Chloride

25 and Sodium Carbonate 3 in water 80 and heat again until the soap rises completely. Cool and wash with a little water, press and cut in pieces and dry in a warm place. For use it is powdered.

Sapo Kalinus. P.G. VI., P. Austr. is made with Linseed Oil. Soluble about 1 in 4 water, and 1 in 1 alcohol 90%.

Saponification is outlined in Vol. II., in which also are details on the composition of Pharmacopœial Soaps, Toilet, Shaving and other Soaps, the use of Resin and Mottle, Transparent Soap, Saponification Nos. of Oils, etc.

Sodii Oleas. *Syn.* EUNATROL.

$CH_3(CH_2)_7CH : CH(CH_2)_7,COONa=304{\cdot}261.$

In 2 and 4-grain pills and is given to dissolve gallstones. Useful as cholagogue. **Capsulæ Sodii Oleatis** contain 5 grains.

Capsulæ Sodii Oleatis Compositæ.—*Martindale.*

Dose.—One night and morning or 2 at night with hot water.

Sodium Oleate 1 grain, Phenolphthalein ⅓ grain, Salicylic Acid 1½ grains, Menthol, 1 grain.

A mildly aperient antiseptic for gallstones.

CARCINOMA treated with Sodium Oleate by J. H. Webb (Melbourne) on **Shaw-Mackenzie's Theory** that Sodium Oleate and various tissue extracts act as co-enzymes, *i.e.*, activating the dormant *Prolipase.* Treatment consisting of the taking of 20 grains of Sodium Oleate daily in pill form for a year and 30 injections of 10 Cc. of Sodium Oleate solution—beginning with ½% and increasing to 5%—dissolved a large and adherent schirrus tumour of the breast but failed to check an epithelioma of the skin which followed and proved fatal.—Albert Wilson, Edin. Med. Jl., May, '25,248-9. *cf.* p. 763.

Subcutaneous injections of 1 to 3 Cc. of Sodium Oleate solution 0·8% have been found of benefit in cancer of the breast.—J. Shaw Mackenzie, Jl. Trop. Med., Apl. 1/27,85.

Sapo Superadipatus, Ph. Ned. V.

Anhydrous Wool Fat 4, Potash Soap 16, Hard Soap 80.

Sapo Superadipatus cum Pice Liquida, Ph. Ned V.

Anhydrous Wool Fat 4, Liquid Tar 5, Potash Soap 11, Hard Soap 80.

Sapo Superadipatus cum Sulfure Precipitato, Ph. Ned V.

Anhydrous Wool Fat 4, Precipitated Sulphur 10, Potash Soap 16, Hard Soap 70.

Sapo Mollis Peroleatus.—Tallow 32, Olive Oil 5, Potassium Hydroxide 3, Sodium Hydroxide 2, Borax ¼, Distilled Water 100. Dissolve the Potassium and Sodium Hydroxides and Borax in Water, then heat to boiling, add the tallow and oil—boil until well saponified and proper consistency when cold. —ex Edinburgh Infirmary Pharm.

To Soften Water, *i.e.*, to precipitate Calcium Salts, to prevent them forming insoluble soaps in lathering, add a little Sodium or Potassium Carbonate. Filtration through wood ashes was formerly used for laundry work. For **Chalky** and other **Waters,** see *Vol. II.*

Medicated Soaps.

Ⓟ Biniodide, containing ½%, 1% and 3% mercuric potassium iodide, reliable antiseptic.

Carbolic, toilet and medicinal, strength 5%, 10% and 20%.

Formosyl toilet and medical 10%.

Ichthyol 5% and 10%, in skin affections.

Ichthyol and Salicylic Acid

,, ,, Sulphur 5% each

Lanolin and Ichthyol.

✱ Sphagnol 5 and 15%.

Ⓟ Sublimate 1%.

Sulphur, Camphor and Balsam of Peru, of each 5%.

Sulphur, Camphor, and Carbolic Acid, of each 5%.

✱ Vinolia, medical.

✱ Wright's Coal Tar contains the equivalent of 15% of phenol combined to be unirritating. The oils for scenting are of the highest antiseptic value, containing, *e.g.*, thymol, carvacrol and cinnamic aldehyde.—*cf.* Essential Oils, *Vol. II.*

For details of the manufacture of **Medicated Soaps** (direct from Cocoa Nut Oil and Soda Lye), *vide* E.P., XV., p. 713.

The preparation of Benzene and Turpentine Soaps, the latter having considerable bleaching power.—P.J., ii./27,514.

Linimentum Saponis (*B.P.* '14). Soft Soap 4, Camphor 2, Oil of Rosemary 0·75, Distilled Water 8·5. Alcohol 90% to 50.

Epidermophytosis well treated by U.S.P. Soap Liniment. Whitfield's Ointment disappointing.—C. S. Butler and Co-workers, Int. Conf. Trop. Am., '24,522.

Spiritus Saponis Kalinus (SPIRITUS SAPONATUS, P.G.VI.).

Saponify Olive Oil 6, with Liquor Potassæ (15%) 7, and Alcohol 7½ by agitation until it mixes clear with alcohol and water. Add then Alcohol 22½ and Water 17; filter.

Soap and Spirit Lotion Soft Soap 1, in Alcohol 90% *q.s.* to 2.

Spiritus Saponis Kalini, P.G. VI. is a solution of Potash Soap 1, in Alcohol (90%) 1.

Ether Soap.

Dissolve Soft Soap 32 in Alcohol (90%) 20, allow them to stand 24 hours and decant carefully from any sediment, then add Methylated Ether Sp. Gr. 0·720, 52 parts. As a detergent prior to operation.

Ⓟ Ether Soap with Mercuric Iodide, contains 1 in 1,800.

Mercuric Iodide 25 grains, Potassium Iodide ½ ounce, Soft Soap 2 lbs., Alcohol 90% 1 pint, Ether *q.s.* to 5 pints.

* Formosyl Glycerin Soap. (*Distinguish from 'Formosyl.'*)

A yellowish liquid (prepared scented and unscented) containing 40% of Glycerin. A bland and soothing preparation for delicate skins. It is a constituent of **Salicifrice.**

*** Sterilla (T.M. 300899).—A Liquid Surgical Antiseptic Soap**

Synol Soap.—A liquid soap containing Cresols and Camphor.

Acetone Soap.

Mix Green Soft Soap 25 with Water 30, and add Acetone 45. For **surgeons' use. It is more economical than a spirit preparation.**

Pasta Mackintosh. MACKINTOSH PASTE R.V.I.

Soft Soap 7, Powdered Pumice Stone 7, Prepared Chalk 7, Water 1, Cyllin 1.

Soap and water washing has been proved to be of ***poor value*** in washing woollen undergarments, in an interesting paper by John A. Bolton (Leicester) 1924. Garments worn next to the skin in all climates, when washed with soap and water were found to contain masses of dead skin cells, sticky lime and magnesium salts of fatty acids, along with a quantity of other bodily secretion and organisms. Bolton advises that no soap should be used for washing garments worn next the skin.

Bolton's method of washing garments worn next to the skin.

Turn the garment inside out, soak in warm water for 10 to 30 minutes and wring it out. Then soak the squeezed garment in a wood or earthenware bucket of cold water containing about ½ ounce Hydrochloric Acid B.P., which should make the bath slightly acid to the tongue, for about 10 minutes: wring out, and rinse in warm water. Then soak in a bucket of warm water containing about ½ ounce of Strong Ammonia for about 10 minutes and work it about. Wring out, repeat with Ammonia if necessary and finally rinse in warm water. The Hydrochloric Acid dissolves the Lime, Magnesium, and Iron compounds which have been formed by interaction of the salts in the perspiration, and by the fatty acids of the skin fat. The Ammonia saponifies the fatty acids from the sweat fat still remaining undissolved as soluble salts.

The same process can be used for *sponges* and for the human body.

Search for a specific treatment of tuberculosis.

The main idea underlying treatment in bacterial disease, it is suggested, is the production of the lipolytic or ***fat-splitting ferment lipase*** in the tissues. This, in tuberculosis, acts on the fats and lipoids of the bacillus and is injurious to it. Serum proteins, various tissue Extracts, Sodium Oleate and inorganic Salts such as the phosphates and Salts of Calcium have the power of increasing or stimulating this lipolytic action. The same principle in part underlies treatment by vaccines and tuberculins in which activators or co-enzymes of the fat-splitting ferment are present in varying degree. The tubercle bacillus is known to contain protein, lipoids, fatty acids, phosphate and calcium in addition to a large amount of fats and waxes. In view of this interpretation of the action of vaccines and tuberculins, the products of ferment and bacterial digestion may prove more serviceable than vaccines. It is noted that the serum of patients recovered from tuberculosis markedly accelerates or activates the fat-splitting action, compared with a decreased power in the acute stages. The former contains the products of digested or partially digested tubercle bacilli, the result of lipolytic or bactericidal action. Such products,—fatty acids or particular soaps derived from the action of the lipolytic ferment on the fats and lipoids of the tubercle bacilli may be not only protective or act as stimulants of lipolytic activity but the initial action of the ferment may liberate other contained activators. J. A. Shaw-Mackenzie, B.M.J. i./21,402 *q.v.* for this worker's further refs. The idea has been made use of in the **Sodium Morrhuate Treatment** *q.v.*

Blood serum of recovered mice shows that a natural and increased production of lipase and of fatty acids in the tissues are important factors in the protective mechanism. Sodium Oleate, ***inter alia***, increases the action of lipase in vivo and in vitro. (J. A. Shaw-Mackenzie).—W. J. Simpson, L. i./22, 404; *cf.* our p. 761.

Lipase Preparation for Injection.

We had occasion recently (1927) to go carefully into this matter in our laboratories. Castor Oil Lipase offered the best possibility. It was made by the method of Armstrong and Gosney, and the product was found capable of splitting Olive Oil in almost theoretical amount in a few hours at 40° C. Instead of drying the product, it seemed possible to make a suspension in Glycerin for injection. (Castor Oil Lipase material kept in the dry condition for two years had lost its power.)

In the course of the work it was proved that treatment with 1 and with 5% Sodium Chloride to remove Ricin did not materially alter the lipolytic power —5% appeared to be about the limit strength to use. It was also determined, as others have suggested, that a ***clear filtrate, e.g.,*** after centrifugalising a suspension of de-ricinised material in 50% Glycerin and water was ***void of fat-splitting power.***

Lipase is thought to be *on* the vegetable tissue.

The conclusion of all the experiments was that a preparation of this kind was useless for clinical use, being toxic. A Soy Bean extractive was also unsatisfactory.

SINAPIS.

Mustard.

The dried ripe seeds of *Brassica nigra* (*Semen Sinapis*, P.G.V., P. Austr.) and *B. alba* (*N.O. Cruciferæ*), powdered and mixed. The condiment sold as mustard consists of this mixture from which most of the oil has been expressed and the cortical portion of the black seed has been removed.

Uses.—As an emetic a tablespoonful in half a pint of warm water. In small doses is a stomachic and appetiser. Externally a counter irritant when applied as a poultice, or added to hot water and used as a foot bath. It may blister tender skins.

Charta Sinapis, B.P. '98, is made with bruised black and white mustard seeds exhausted of fixed oil, made adherent with **Liquor Caoutchouc**. The oil being removed, the glucoside is more readily attacked by the ferment.

Linimentum Sinapis (*B.P.* '14).

Volatile Oil of Mustard 3·5% in a Castor Oil, Camphor and Alcohol mixture.

Oleum Sinapis Expressum. Sp. Gr. 0·921 to 0·923.

The average content of Expressed Oil in the black seeds is 26%. In the white 27%. Used as a rubefacient.

Comparison of Chinese **Colza Oil** (ex *Brassica Campestris v. Chinoleifera*), Black Mustard, White Mustard, **Rape Oil** and other varieties.—P.J. i./21,519.

Oleum Sinapis Volatile.

Average dose (U.S. X.).—$\frac{1}{8}$ minim (0·008 Cc.).

Consists principally of Allyl-iso-sulphocyanide. FR. CX. makes the chemical synonymous with **Oleum Sinapis Aethereale.** Sp. Gr. 1·014 to 1·025. *B.P.* '14 requires a content of 92% of this substance. *Soluble* about 1 in 50 of water, readily in ether and alcohol. This solution is suitable as a rubefacient.

Percentage of volatile oil from Black Mustard seeds varies from 0·63—to 1·23, according to geographical source. English seeds yielded 1·07%.—Finnemore.

Volatile Oil of Black Mustard is a powerful antiseptic. It has been used as a preservative for wines, 1 in 100,000 stated to be effective without affecting their odour or flavour.—Finnemore. *Cochlearia Armoracia*, radish, turnip, watercress, contain mustard oils.—Wild. P.R.S.M., Ther. Sec.

Minimum fatal dose of **Allyl-iso-sulphocyanide** is stated to be $\frac{1}{5}$ minim per kilo. It cannot be recommended for internal use. Excessive inhalation of the essential oil into the nostrils is dangerous.

Allyl Compounds: Allyl Sulphide, Allyl Isothiocyanate, Acetate and Allyl Alcohol investigated as to action on rabbits and pithed frogs—the Isothiocyanate is most powerful and the Acetate the least. The poisonousness is due to the Allyl contained. They all affect the respiratory system chiefly and the circulation less. A complete research into the physiological action of these bodies.—B.M.J ii./11,609. *Vide* also Oleum Allii Essentiale.

Spiritus Sinapis, P.G. VI. Oil (volatile) 1 to Alcohol (90%) 49.

✱**Musterole** (T.M. 350827). A counter-irritant for rubbing into the skin as preventive against chills and for rheumatic pains.

Thiosinamin.—*Syn.* RHODALLIN, ALLYL-THIO-UREA, ALLYL-SULPHOCARBAMIDE. $SC.NH.C_3H_5NH_2=116{\cdot}144$.

Dose.—Internally $\frac{1}{2}$ gradually increased to $1\frac{1}{2}$ grains (0·03 to 0·1 Gm.) (with caution—in capsule or alcoholic solution). Hypodermically $1\frac{1}{2}$ to 3 grains as in the form of **Injectio Thiosinamin et Sodii Salicylatis vel et Antipyrin.**

(T.M.: Fibrolysin is no longer a Trade Mark. No. 271208 expired 1919 through non-payment of fees. Fibrolysan No. 319529/1909, is also wound up).

Manufacture.—To essential oil of mustard 456 Gm. add in portions strong solution of ammonia 200 Gm. in Alcohol 200 Cc. The mixture becomes hot (or slight warming may be required to promote interaction)—cool down below 40° C. and shake until the odour of the mustard oil disappears. Evaporate at 40° C. to about 650 Gm. and leave to crystallise. Recrystallise from water. The crystals have melting point 74° C. Evaporate mother liquor and wash further crop of crystals with water and then with ether. Slight modifications of this process will be necessary as experience shows. *Start with good Mustard Oil.*

Soluble in water 1 in 18, alcohol about 1 in 2, and in ether.

Flavoring.—It is practically void of taste.

Uses.—To some extent internally, but chiefly by injection (*vide infra*) with Sodium Salicylate, for absorbing fibrous and scar tissue. Has been used for keloid and in scleroderma.

TINNITUS AURIUM has been treated by 5% aqueous solution hypodermically with improvement, dose being increased from 6 to 35 minims, also a 10% solution and a 20% Glycerin Solution. Should be tried before operating on the middle ear or labyrinth for this trouble.

PERICARDIAL ADHESIONS have been treated by 3 grain doses in 80 minims of water, every other day in the flanks, for 30 days.

SCAR KELOID resulting from a burn received 5 injections of Thiosinamin of 0·2 Gm. with each, 1 day's interval. Produced poisoning symptoms, sweating, headache (lasting 2 to 8 days). Ultimately the treatment was curative (after 18 injections).

Caution is needed whenever the patient experiences headache after the first injection of Thiosinamin. To our knowledge it may cause transient poisonous symptoms.

Injectio Thiosinamin et Sodii Salicylatis.

Dose.—1 to 2 Cc. every two or three days.

Sterules of this *Compound Thiosinamin Injection* prepared with a special solvent are made 1 and 2 Cc. for use either intramuscularly or hypodermically, and sometimes intravenously, are prepared. 1 Cc. contains approximately 0·06 Gm. (1 grain) of Thiosinamin and 0·09 Gm.—1½ grains—approx. of Sodium Salicylate.

Uses.—For relaxing scar tissue, in strictures of the gullet, urethra and rectum, in stenosis of the pylorus, rheumatoid arthritis, Dupuytren's contraction and eye affections (corneal infiltrations). Massage and stretching or the use of bougies in appropriate cases may be of value. Also in middle ear disease and for tinnitus—but the 'remote action' in such is doubtful, and in pleural adhesions injected locally, or into the gluteal muscles once or twice weekly according to severity of case. In lupus has been tried. It may be of value in arteriosclerosis, chronic rheumatism and paralysis.

Remarkable effect was obtained, we are informed, in treating a case of contracted tendons in a horse. The tendons were so badly contracted that the fetlock joint became permanently flexed and the front of the hoof rested on the ground. Action restored to normal after injection during a few weeks.

Injectio Thiosinamin et Phenazoni.—Martindale. *Syn.* CICATRICINE.

Dose.—8 to 15 minims (½ to 1 Cc.). = 1½ grains to 3 grains (0·1 to 0·2 Gm.) Thiosinamin, 2½ to 5 grains (0·16 to 0·3 Gm.) Phenazone and 1/20 to 1/10 grain Eucaine Lactate.

It has been used in the treatment of cicatricial tissue. It should form a useful injection, being non-toxic and non-irritating.

Patents:—

Other substances have the power of furnishing concentrated aqueous solutions of Thiosinamin, which keep well and are suitable for therapeutic purposes. Sodium Biborate, Urethane, Benzoates, Cinnamates, Glycocoll, etc.—Subject of Patent 29,247/1909. See also 22,533/1905—both voided by time.

Unguentum Thiosinamin. *Martindale.*

Thiosinamin 1, Oleum Anseris Benzoatum to 10. In warm weather 5 or 10% of White Wax may be necessary.

Unguentum Thiosinamin et Antipyrin.—Thiosinamin 10%, Antipyrin 16·5%, in Oleum Anseris Benzoatum.

'Anserine' Mulls of Thiosinamin are prepared 10% strength.

Thiosinamin-ethyl-iodide. *Syn.* TIODINE, THIODIN.

$S = C(NH.C_3H_5)(NH_2\ C_2H_5I) = 272{\cdot}116$.

Prepared by heating Thiosinamin and Ethyl Iodide under a reflux condenser. Forms white crystals melting at 68° C. *Soluble* readily in water and 1 in 1 in Alcohol (by our experiment).

Ampoules are prepared containing 3 grains (**0·2 Gm.**) of Tiodine. *Dose.*—The contents of one ampoule every other day.

✱**Iodolysin** (T.M. 312678).—A similar preparation, stated to contain 43% Thiosinamin and 47% Iodine. **Iodolysin solution** for oral use, 30 minims, containing 1 grain Thiosinamin and 1 grain Iodine, also **Injection** (hypodermic), 15 minims, containing 1½ grains of each. **Ointment** and **Pigment** (local) are prepared. To soften cicatrices and promote absorption of fibrous tissue.

Rheumatoid arthritis improved by Iodolysin internally.—B.M.J., ii./25,1040.

Pills are made equivalent to 7½ grains of Potassium Iodide. In rheumatoid arthritis—2 to 6 pills daily after food. Well tolerated and less depressing than Potassium Iodide.—Sir T. Horder, Clin. Jl., July 11/23,330.

Thiodotoxyl. A solution containing 10% each of Atoxyl and Thiosinamin-ethyl-iodide. Used in treatment of cancerous growths.

SODIUM.

Na=22·997.

A soft white metal, decomposing water. Is prevented from oxidisation by keeping under mineral naphtha.

Sodii Acetas. $CH_3COONa,3H_2O = 136·069$.

Average dose.—15 grains (U.S. X. 25 grains).

Colourless crystals or white powder. Soluble in water about 1 in 1 with alkaline reaction, and about 1 in 35 in alcohol 90%.

Uses.—To some extent as a diuretic. It is excreted as carbonate.

Flavoring—Glyl Pini, Syl Lavandulæ; Syrupus Aurantii.

Sodii Chloridum. NaCl=58·454. *Dose.*—10 to 60 grains (**0·6 to 4·0 Gm.**). White cubical crystals.

Soluble 1 in 2¾ of water (not more in boiling water) in Alcohol 90% (about 1 in 200). It produces neither rise in temperature on dissolving (exothermic), nor diminution (endothermic),—it is therefore almost equally soluble in either hot or cold water.

Flavoring.—Syl Coriandri, Syl Menthæ Piperitæ (double dose), Syrupus Zingiberis.

Uses.—Although in common use is not requisite to those having ordinary mixed diet, but is necessary to vegetarians. Given in excess leads to scurvy, while insufficient salt leads to anæmia, debility and œdema of face and ankles. Large doses are emetic.

As a *purgative* may be given in dose of 120-240 grains. As a laxative. 75 grains in a tumbler of cold water, it is stated, acts efficiently and without pain. Rectal injections are used to kill threadworms. Hypodermically or into the veins as Normal Saline Solution *q.v.*

SALINE WATERS AND COMMON SALT. Both men and animals take salt, not because they need it, but because the taste has been acquired—by human beings in early life. Considering the various 'salts in the body,' it is strange that this one only is taken so largely. Estimating that Sodium Chloride forms 1/200 of the body, this would be 320 Gm. for a 64 kilo person. It is common for a man to take an average of 20 Gm. daily. About 2 to 3 Gm. is sufficient. The excess may be harmful, leading to morning diarrhœa, chronic eczema, psoriasis, etc. Some of the chronic diseases of middle and late life are caused by abuse of salt. It stands to disease as foul air does to respiratory diseases. —P.R.S M.—Feb. '10, Baln. Sectn., p. 59, *et seq.* Probably individuality has a good deal to do with it. Many persons take large amounts with apparently no ill effect and, *per contra*, many appear healthy on practically nil.—W. H. M.

Saline Solution, Normal. PHYSIOLOGICAL SALT SOLUTION.

This should be isotonic with the liquid of the blood corpuscles and possess the same osmotic pressure as the liquor sanguinis. For man a solution of sodium chloride 0·9% (U.S. X, 0·85%), or approximately 80 grains to the pint of boiled water, freezing at closely—0·56° C., is generally used for intravenous injection in hæmorrhage, uterine flooding, or collapse.

SOLUTÉ DE CHLORURE DE SODIUM ISOTONIQUE, INJECTABLE. FR. CX. SUPP NOUV. (1926) is 0·8% sterilised at 120° C for 15 minutes.

The injection should be made *at least* at 105° *F.* (*this is important*), into any convenient vein, the rate of injection varies; it may be as rapid as a pint in ten minutes, or as slow as 8 ounces per hour (see refs. *infra.*). Injections are also made into the rectum.

Ringer's Solution. There were several formulæ. Mostly used now is Sodium Chloride 0·8, Potassium Chloride 0·0075, Calcium Chloride 0·01 Sodium Bicarbonate 0·01, Distilled Water to 100. To have the above freezing point should be composed of Sodium Chloride 0·88, Potassium Chloride 0·025. Calcium Chloride 0·02, Sodium Bicarbonate 0·015, Distilled Water to 100.—P.J. i./12,357. P. JAP. IV. adopts the first mentioned.

Ringer's original solution resembled frog's blood in its saline composition Locke altered the composition of the salts contained, increasing the Sodium Chloride from 0·6 to 0·9% and adding Glucose. The cerebro-spinal fluid of man is virtually this modification.—W. D. Halliburton.

Locke's Solution contains Sodium Chloride 0·9, Potassium Chloride 0·042 Calcium Chloride 0·024, Sodium Bicarbonate 0·05, Dextrose 0·1%.

Ringer's Solution, as also **Locke's Solution, Sterules** are prepared for dilution: 1 produces 1 litre.

Fischer's Modified Ringer's Solution.

Sodium Chloride 0·5, Calcium Chloride 0·04, Potassium Chloride 0·02, Distilled Water to 100. This is employed in surgical practice instead of Normal Saline, *e.g.*, for dissolving Kerocain.

A FLUID HAVING ADVANTAGES OVER RINGER'S OR TYRODE'S SOLUTION. This solution possesses constant P_H value of 7·52 at 37°, is isotonic with blood, is sterilisable and contains calcium and potassium in a ratio approximating to that in arterial blood. Similar relation exists between total uni- and bivalent positive ions.

STOCK SOLUTION contains sodium chloride 10·5 Gm. potassium chloride 0·5 Gm., magnesium chloride 0·1 Gm., calcium chloride 0·3 Gm., n/$_1$ phosphoric acid 5 Cc., and 50 Cc. of water.

For use filter 50 Cc. and add 1 litre of water, heat and when cool saturate with oxygen, and add 5 Cc. of sterile n/$_1$ sodium carbonate solution.—J.C.S.A. 1922, i., 964.

Fortunately only an approximation to an isotonic solution is necessary, as mucous membranes are practically insusceptible to changes in osmotic pressure within fairly wide limits. The solution should be slightly alkalised. 0·1% Sodium Bicarbonate is sufficient.—Marshall.

NOTE.—The **Lacrymal Secretion** is stated to contain 1·3% Sodium Chloride and 0·5% Albumin. It has been suggested to make eye lotions isotonic.

Saline Solution Sterules contain in saturated solution sufficient for two pints. Convenient for carrying in the surgical bag.

'Solubes' Sodium Chloride, 20 grains each, are useful for producing extemporaneously 5 ounces of a normal saline solution.

Uses and References.—Largely employed in surgical shock by intravenous and rectal injection; also in post partum hæmorrhage. Particularly useful in the hæmorrhage of typhoid. Also aids recovery from poisoning by Carbolic Acid, Morphine and Alcohol. Vomiting, recurrent of infants (given per rectum or subcutaneously,) cholera, pneumonia, uræmia, relapsing fever, delirium tremens, tetanus and diphtheria have been well treated by subcutaneous and intravenous use.

ECLAMPSIA has been treated by intravenous injection in severe cases, but the treatment is condemned by others as being dangerous, especially where kidneys are involved.

SURGICAL SHOCK.—Saline Fluid injected to the extent of 300 Cc. per kilo, causes embarrassment and failure of respiration. When the causes of shock are active an injection of fluid cannot force recovery.—J. D. Malcolm, M.P.C., May 17/22,420.

Instead of Saline injections, Gum Saline-Bayliss (Sodium Chloride 2 Gm., Potassium Chloride 0·05 Gm., Calcium Chloride 0·05 Gm., Gum Acacia 5 Gm., Distilled Water 100 Cc.) is advocated for loss of blood if actual blood transfusion is impossible.—H. Pritchard, B.M.J. i./27,793.

In certain mental diseases in which there was a toxic element a litre of Ringer-Locke injected twice weekly.—J. P. Steel, B.M.J., ii./27,1177.

CHOLERA.—Before giving hypertonic intravenous injections of saline, precede with an alkaline injection of Sodium Bicarbonate 2 drachms, in water 1 pint.—L. M. Chattergee, T.D.B., Vol. 19, 1922,740.

Plombière douches can be given at home—1½ to 2 pints slowly. Normal saline at 100° F. Two or three douches a week the maximum. Three weeks for a course. Use a rubber rectal tube, with end lubricated. Tube inserted 3 inches—generally 2 to 2½ inches (it depends—some say 6 ins.), patient being on left side.—B.M.J., ii./25,545.

Rectal injections of Saline 2 pints to which Aspirin 15 grains and Brandy 1 ounce were added, following operation in consequence of traumatic rupture of the spleen.—W. H. Cam, B.M.J. i./16,200.

Hypertonic Saline Solution.—Sodium Chloride 5% in distilled water with ½% Sodium Citrate added (the proportion is sometimes varied up to 10% of salt and 1% Sodium Citrate).

WOUND TREATMENT.—Based on the well-known theory of Sir A. E. Wright and others that the patient's blood fluids and the white corpuscles are the only bactericides to be counted upon, the idea, broadly speaking, of the Hypertonic Saline treatment is to promote active lymph flow from the wound by the use of this solution and the provision of simple mechanical drainage.

Numerous abstracts on this method in the 17th Edn., p. 700.

As a 'contra' view the following is of interest.

In theory the method is excellent. In practice results varied. Not suitable for routine use. The strong solution is extremely irritating, causing pain. A dressing with it should not be covered with non-permeable tissue which will check outward flow of discharge which it causes.—Casualty Station Criticism.—A. Don, B.M.J. i./16,648.

Salt Packs, *i.e.*, by packing wounds with Salt or Salt Tablets in gauze, were much used to wounds in war.

Antiseptic Power of Hypertonic Saline.

The inhibition of growth, *e.g.*, of *Staphylococcus pyogenes aureus* and *Bacillus Coli* by 5% hypertonic saline, experiments showed, is very slight. With 10 or 12% salt, there was no proliferation of the organisms in question.—L. Garrett Anderson and co-workers, L. i./16,1119.

Hypotonic Saline Solution St.G.H. is 0·3%.

Trunecek's Serum for nervous ailments and high arterial tension.

Dose—Subcutaneously 1 Cc. to commence with, increasing by 0·2 Cc. May also be given by rectum and mouth.

Sodium Chloride 492, Sodium Sulphate 44, Sodium Phosphate 15, Sodium Carbonate 21, Potassium Sulphate 40, Water to 10,000.

Tablets of Trunecek's Serum are prepared 5 grains each, *i.e.*, equivalent approximately to 5 Cc. of the serum. *Daily dose* 3 to 6 with meals. Administration *per os* is equally effective.

For atheroma and sclerosis of arterial coats.

Trunecek's Serum has a freezing point—3.29° C. and an osmotic pressure 5·875 times greater than blood serum—*i.e.*, it is strongly hypertonic.

Cheron's Serum.—Sodium Chloride 2, Phenol 1, Sodium Phosphate (Na_2HPO_4, called Neutral Phosphate in France) 4, Sodium Sulphate 8, Distilled Water to 100.

Gelatin Saline and **Glucose Sterules** are described, pp. 424, 427.

Gum Acacia with Sodium Chloride for intravenous injection, to replace blood lost by hæmorrhage, see p. 1.

Hayem's Solution. Sodium Chloride 5, Sodium Sulphate 10, Water 1,000. Sterilise. *Caution.*—This must be distinguished from Hayem's Blood Examination Fluid *which contains Sublimate.*

Regenerative Tablets.

Dose.—6 Tablets daily, 2 at each meal. The mixed inorganic Salts of the normal blood, each Tablet containing Sodium Sulphate 0·04, Chloride 0·4, Carbonate 0·016, and Phosphate 0·012 Gm., with Magnesium Phosphate 0·016 and Calcium Glycerophosphate 0·012 Gm. Useful in the treatment of arteriosclerosis. Thought to exercise a reviving stimulating action upon the vessels and circulation—preferable to the customary Iodine treatment, as they are free from the lowering effect of that substance. High rectal injections of a solution of 10 Tablets to the pint of water (approximating normal artificial serum solution) have been practised. This method has proved of value in heat collapse, weakness from vomiting of alcoholism and pregnancy.

Solubes Sodium Chloride Compound.—(*Hypertonic*).

Sodium Chloride 40 grains, Potassium Chloride 2 grains, Calcium Chloride 1·3 grains.

Dose.—Two to the pint to make a slightly Hypertonic Solution; 4 make an approximately double normal strength Solution suitable for rectal injection.

CHOLERA (the collapse stage) and diarrhœa treated. Hypertonic Intravenous Injections of this Solution, in addition give Calcium Permanganate *Drink* ½ to 2 grains increased up to 6 grains to the pint and *Pills* (Salol coated) of 2 grains.

The high temperature in the reaction stage of cholera should be controlled by cold sponging and iced water rectal injections. Though the surface temperature may be normal the rectal temperature may be anything up to 106° F. Prevention of uræmia will be effected by diluting the blood to at least the normal point by isotonic salines, by use of blood pressure raising drugs such as Digitalin, Strophanthin, Caffeine, and the vaso-constrictors, Adrenalin, etc.

Two **Calcium Permanganate Pills** are given every ¼ hour for the first 3 hours and then every hour until the stools become green and less copious —which usually occurs within about 12 hours.

The permanganate *per os* destroys toxins in the bowel by oxidation. Sodium Bicarbonate intravenously to rectify the almost constant reduction in the alkalinity of the blood in all stages of the disease; as much as 320 grains given. The amounts varied from 160 to 1,120 grains in those cases which recovered while in five successful cases 800 or more grains were injected before free secretion of urine was obtained.—Sir L. Rogers, L. ii./15,219.

Artificial Sea Water.—The following has been advised for injection as enema:—

Sodium Chloride 27, Magnesium Chloride 3, Potassium Chloride 1, Magnesium Sulphate 1¾, Calcium Sulphate 1, Distilled Water to 1,000.

Natural Sea Water has been injected hypodermically in eczema and digestive disorders: see Edn. XVIII. p. 745.

ARTHRITIS treated by injections of sea water, the dose varying from 10 to 500 Cc.—T. E. Lawson, Pr., Aug. '27,122.

Enema Sodii Chloridi, N.E.H.

Sodium Chloride ½ ounce, Warm Water 10 ounces. Use from 1 to 6 ounces for children according to age.

Dechlorination or Salt-free Diet.

NEPHRITIS has been treated by this (in many forms of nephritis the kidneys fail to eliminate salt). Copious diuresis sets in, œdema disappears and remains more or less absent so long as the treatment is kept up. Food should be cooked without it. The salt-free diet is, however, often disappointing. It should be tried where heart and lungs are hampered by excessive œdema, and in migraine and chlorosis. The theory of salt retention does not, however, wholly explain œdema following gastro-enteritis in children nor all cases of œdema in Bright's disease.

EPILEPSY treated by Sodium Chloride reduction. Reduce the salt in the diet and the absorption of Bromide will increase. The combined treatment, *e.g.*, with Bromide Tablets containing 2 grains of Salt and 18 grains of Bromide to be used to salt broth, satisfactory.—L. ii./12,918.

Carbohydrates increase the retention of water while fats diminish thirst. If no salt be added to the food the body loses 15 to 25 Gm. of sodium chloride and 1½ to 2½ kilos of water; a saltless diet is therefore itself diuretic. Generally speaking, the intake of water and salt increases the quantity of water taken up by the tissues and consequently may cause œdema.—P. E. Morhart, B.M.J.E. i./26,86.

Baths of Common Salt (or Tidman's Sea Salt), about 2 pounds to each bath, act as a tonic and stimulant, *e.g.*, in chronic rheumatism.

Sal Marinum Artificiale.—Potassium Iodide 1, Potassium Bromide 1, Calcium Chloride 40, Magnesium Sulphate 200, Bay Salt 760.—Ph. Notes.

***Cerebos** (T.M. 22770) **Salt.**

Sodium Chloride with 4% of phosphates, mostly Calcium Phosphate; less deliquescent than 'Salt.' Is intended to replace the phosphates removed in the preparation of food.

Sodium Phosphate stated to be added to Table Salt to-day to prevent its going moist.—B.M.J., ii./27,28.

Digestive Salt *Syn.* *PEPSALIA. (T·M. 90722).

This consists of Sodium Chloride and Pepsin.

Pulvis Sodii Chloridi Compositus.

Sodium Chloride 6, Potassium Chlorate 1, Alum 1, Boric Acid 1, Borax 6. A saltspoonful in a half tumbler of warm water as a gargle is very beneficial for inflamed conditions of the throat.

Unguentum Sodii Chloridi. K.C.H., St. Bart.'s H. UNGUENTUM SALVAS R.V.I.

Sodium Chloride and Soft Paraffin, equal parts. R.N.H. has Sodium Chloride 1, Sodium Bicarbonate 1, Soft Paraffin to 4.

Ringworm (of hairy regions). Croton Oil treatment is painful. Use this Ointment instead. Rub in daily, after bathing the head with very hot water. Even more painful than Croton Oil.—A. Whitfield, L. i./23,1124.

Sodii Bromidum. NaBr = 102·913.

Dose.—5 to 30 grains (**0.3 to 2 Gm.**). Slipule No. 0 holds 10 grains.

Tablets, 5 grains (0·3 Gm.). *Dose.*—1 to 6.

In slightly deliquescent granular white crystals, tasting like common salt; soluble 8 in 9 of water.

Flavoring.—Syl Menthæ Piperitæ, Glyl Coriandri; Syrupus Aromaticus (double dose), Syrupus Zingiberis.

Uses.—In insomnia, maniacal attacks, and hysteria. Full doses combat morphine habit.

A mixture of bromides in the proportion of sodium bromide 2, potassium bromide 2, and ammonium bromide 1, is said to have a better action than one salt alone.

It is used as substitute for the salt in the 'saltless' ('hypochloridization') treatment of epilepsy. (*See also* Sodium Phosphate.) The theory is that diminishing the chloride increases the readiness with which bromide enters the blood stream and nerve elements. *cf.* Dechlorination, p. 770.

The addition of 20 drops of Sal Volatile, or 5 drops of Fowler's Solution to the treatment prevents the rash which often disfigures patients taking Bromide.

Delirium Tremens in America treated by subdural injection of 1% Sodium Bromide Solution after removing 50 or 60 Cc. of cerebro-spinal fluid. Delirium controlled.—Boston Med. & Surg. Jl., Oct. 30, 1913; L. ii./13,1562.

Tabes.—Intrathecal injection of Sodium Bromide recently tried. 1% solution used. In spastic patients, 1·6% (isotonic with body fluids.) 10 Cc. of cerebro-spinal fluid removed and the same quantity of solution introduced. —L. i./23,607.

Gall-bladder and ***gallstones pictures*** obtained in 60% of healthy persons and over 80% of those with diseased gall-bladders, following administration by the mouth of a single dose of 10 to 20 Gm. Sodium Bromide or Strontium Bromide dissolved in 100 or 150 Cc. of water. Rontgenograms taken at 5 to 12 hours afterwards. Patient should be on very light diet the preceding day.—Presse Med., Aug. 29, '25, per Jl. A.M.A., ii./25,1260. *See also ibid.*, ii./25,74.

Urinary Radiology. Ammonium Bromide preferable to the Sodium salt, a 25% aqueous or Glycerin solution being used.—B.M.J.E., ii./27,105.

Eczematous Processes. Sodium Bromide intravenously, 10 Cc. of a 10% solution, said to be beneficial. Two to 5 injections usually sufficient, but up to 15 may be necessary. Chronic eczema showed least response.—Jl. Intrav. Therap., Jan. '26,20.

✱**Sedobrol** (T.M. 347485) **Tablets** weigh 2 Gm., and contain 1·1 to 1·2 Gm. of Sodium Bromide and 0·1 Gm. Sodium Chloride, in addition to vegetable extractives and fat. Suggested for salt-free Bromide Treatment or diet—the tablet being simply covered with 100 to 200 Cc. of hot water to produce a bouillon for use in nervous affections, epilepsy and migraine.

Dose.—1 to 3 tablets *pro. die.*

Sal Bromatum Effervescens.

Dose.—60 to 120 grains (**4 to 8 Gm.**).

Potassium Bromide 400, Sodium Bromide 400, Ammonium Bromide 200, Sodium Bicarbonate 1,000, Citric Acid 380, Tartaric Acid 445, Sugar 175, all in powder, separately dried and sifted. Mix in above order, and granulate with Spirit.

Sodii Bicarbonas. $NaHCO_3$ = 84·005.

Dose.—5 to 30 grains (**0·3 to 2·0 Gm.**).

Occurs in small white crystals or powder. ***Soluble*** 1 in 11 of water; 20 parts are neutralised by 17 of Citric or 18 of Tartaric Acid. Is largely employed in dyspepsia and is of value in diabetes. A little rubbed on to the gum or placed in the cavity of a tooth, stops toothache. Large doses very useful in infantile vomiting; to neutralise the acid intoxication in these cases 100 grains are given when attack threatens, or smaller doses, *e.g.*, 10–15 grains every hour on premonition or attack commencing. It is given in rheumatic affections and in gastric ulcer and found of value in suppression of urine.

Incompatible with acids and acid salts, and with metallic and alkaloidal salts.

Bismuth, Magnesium and Lithium Benzoates and Salicylates are incompatible with Sodium Bicarbonate. It is also entirely incompatible with Aspirin. Acetates of Lead and Zinc liberate CO_2 from it; Diamorphine and Diacetyl Tannin do so also in small quantity.—P.J. i./17,9,257.

Flavoring.—Syl Lavandulæ, Syl Amygdalæ Amaræ; Syrupus Aurantii, Elixir Simplex.

Sodium Bicarbonate Sterules, 3 Gm. in 45 Cc., are prepared for dilution as required. Sterilisation by heating at 100° C. in the Sterule converts approx. 5% of the Bicarbonate into Carbonate.

Diabetic coma treated by intravenous injection of 1 litre of 3 to 5% solution slowly (in ¼ to ½ hour). **Isotonic Sodium Bicarbonate Solution** for this purpose is 1·35 Gm. with water *q.s.* to 100 Cc.

In a normal person 2 drachms of Sodium Bicarbonate *per os* will usually render the urine alkaline in 24 hours. In chronic nephritis the effect is produced by the same dose, but in pregnancy toxæmia a larger dose is required.—L i./13,1366.

INFLUENZA.—Sodium Bicarbonate, 20 to 30 grains four times hourly, relieves abdominal pain and distension, and probably inhibits growth of the streptococcus and neutralises its toxin, the organism being in the bowel.—H. O. Butler, L. i./22,198.

Pyrexia in infants of a few days or weeks old may often be due to pyelitis, in which Sodium Bicarbonate with abundant water is of use.—L. ii./25,510.

Collutorium Alkalinum Compositum, (was in **R.D.H.**)

Sodium Bicarbonate 15 grains, Sodium Chloride 10 grains, Sodium Salicylate 1 grain, Thymol, Menthol, ¼ grain each, Glycerin of Borax 1 drachm, Thymol Solution to 1 ounce. One part to be used in 4 of water. For post-nasal catarrh.

Nebula Alkalina, T.H.

Sodium Bicarbonate 15 grains, Borax 15 grains, Carbolic Acid 4 grains, Glycerin 45 minims, Water 1 ounce. **Dobell's Solution** is approx. half this strength. **Nebula Sodii Bicarbonatis.** Sodium Bicarbonate 20 grains, Glycerin 1 drachm, Water to 1 ounce.

Bain dit de Vichy. FR. CX.

Sodium Bicarbonate 500 Gm. dissolve in the bath at time of use.

Sodii Carbonas. $Na_2CO_3,10H_2O = 286{\cdot}154$.

Dose.—5 to 30 grains (**0·3 to 2·0 Gm.**).

Manufacture.—From Sodium Chloride either by (the Solvay or Ammonia process) interaction with Ammonium Bicarbonate and subsequent ignition (Sodium Bicarbonate is an intermediate product), or by converting it into Sodium Sulphate and the action of heat on a mixture of the Sulphate with Carbon and Calcium Carbonate (Leblanc process).

Soluble in less than 2 of water and effloresces in the air.

Uses.—Internally in gout and skin diseases and for 'acidity.' A **lotion,** 2 grains to the ounce, relieves eczema. 1% is used as mouth wash or nasal douche. Instruments are boiled in a 1% solution to sterilise and to prevent rusting.

Exposure of sodium carbonate to moist air results in its gradual transformation to the hydrogen carbonate. (15—20% in 13 days.)—J.C.S.A. ii./1921, 639.

DIABETIC COMA.—The intravenous injection of 30 ounces of 3 to 4% solution affords best chance of restoring patient, but the Bicarbonate would seem preferable. A 5% solution has caused death.

RINGWORM.—Melt the end of a piece of ordinary washing soda the size of a walnut by holding against a red hot poker, and rub freely into the affected part (hair cut off if necessary). Practically painless and stated to be infallible. Apply Boric Ointment if necessary.—B.M.J. i./13,498.

Sodii Carbonas Exsiccatus.

Approximately 107 of the exsiccated salt are obtained from 284 of the crystals. The salt is seldom used internally as such.

Sodii Carbonas Monohydratus. U.S. X. *Syn.* **Sodii Sesquicarbonas** $Na_2CO_3H_2O = 124{\cdot}01$, is known in commerce as **Concentrated 'Crystal Soda,'** and used as a Bath Salt—water softener. It occurs in small silky crystals.

Sodii Chloras, Sodium Chlorate. $NaClO_3$=106·451.

Dose.—10 to 30 grains (0·6 to 2 Gm.).

Caution.—Not to be rubbed with combustible substances. Colourless crystals with saline taste, soluble 1 in less than 2 parts of water, and 1 in 34 of 90% alcohol.

Used in diphtheria, stomatitis, sore throat, and in urethritis.

Tablets of Sodium Chlorate and Borax, 5 grains. Useful in loss of voice and relaxed throat.

Trochisci Sodii Chloratis, 3 grains in each (0·2 Gm.).

Made with black currant paste, and with plain sugar. More palatable than potassium chlorate.

Gargarisma Chlori. *Syn.* EUCHLORINE GARGLE.

Mix in a pint bottle Sodium Chlorate in powder, 10 grains (with Hydrochloric Acid, 30 minims) and let the gas generate and replace the air in the bottle, then cork the bottle, and let it stand for two minutes; lastly add gradually shaking after each addition, Distilled Water to 1 pint. This is a good antiseptic, *cf. Vol. II.*

According to the hypothesis that $4NaClO_3$ (= 4 × 105·71) are decomposed by 12 HCl (= 12 × 36·19) yielding 12 Cl (= 12 × 35·19) (in part ? as ClO_2) this gargle contains about 10 grains of Chlorine, in other words it is about 0·125% Chlorine.

Useful to remove follicular patches, *e.g.*, in diphtheria 2 or 3 ounces in a quart jug may be used as an inhalation (cold).

If salivation shows itself in Mercurial treatment of syphilis, Sodium Chlorate or Potassium Chlorate mouth-wash or Sodium Chlorate internally 10 to 20 grains best.—W. Knowsley Sibley, Pres., Mar./21,162.

Poisoning by Chlorine.—Treatment will be found under Poisons at end of this volume.

Sodii Citras. $2C_3H_4(OH)\ (COONa)_3+11H_2O$=714·238.

Dose.—10 to 60 grains (0·6 to 4 Gm.). Granular crystals or powder.

Intravenously, rabbits tolerate up to 0·4 to 1·6 Gm. per kilo, suitably diluted, or approx. 6·4 to 25·6 Gm. per 10 stone man (on Meeh's Formula *q.v.*).

Solubility—1 in 3 of water. Is given as a cooling saline in preference to Potassium Citrate.

Sodium Citrate with $2H_2O$, in small crystals which are perfectly dry and remain stable, is now the article of commerce. This is official in the U.S. X. 5 parts of this = 6 parts of the powder with $5\frac{1}{2}H_2O$ as above.—*See also* C. A. Hill, P.J. i./23,153.

Flavoring.—Glyl Aurantii Amari or Syl Vanillæ.

Uses.—Sodium Citrate is oxidised into Carbonate in the system and hence has alkaline effect. It has anticoagulent properties and is added for this reason to blood in transfusion.

Solutions of strength 3·8% are used for washing out syringes and apparatus in blood transfusion and a small quantity (about 10 or 15 Cc.) is mixed with the blood at the time it is drawn from the vein. See also refs., p. 995.

Sodium Citrate Tablets.—5 and 10 grains.

These are used for infant feeding—(1) For weaning the healthy infant; (2) for increasing the amount of milk taken in the 24 hours; (3) for correcting milk dyspepsia (prevents formation of large clots); (4) for the avoidance of scurvy.

In the case of a child 4 months old commence with proportion of 1 grain to the ounce of milk, increase to 3 grains if necessary. Some add in addition double the amount of Sodium Bicarbonate.

The Citrate is thought to influence the clotting of milk by precipitating the bulk of the Lime Salts. Some claim however, that the Citrate redissolves the precipitated Salts. **For Hospital Patients** prescribe 2 grains to each ounce of milk (first brought to the boil). If 4 ounces of milk are given every 3 hours 8 *grains in* 1 *drachm of water* may be ordered (others advise 1 grain only to each ounce).

In ECZEMA and other 'lithæmic' conditions large doses found valuable. Migraine and inveterate neuralgia in gouty adults have been treated.

In BRIGHT'S DISEASE many patients do well on a pure milk diet (2½ to 3 pints slightly diluted) and Sodium Citrate added with advantage, but several difficulties arise in use of milk for nephritis.—P4., Aug. '09,157.

GLAUCOMA treated by subconjunctival injection of solution 4·05 to 5·41% strength.—L. i./12,226.

In PNEUMONIA 30 to 40 grains every two hours it is stated will cause rapid lysis.

VENOUS THROMBOSIS as occurring in enteric treated by intravenous injections (up to ½ pint) of 0·5% Sodium Citrate—good results.—H. F. Marris, B.M.J. ii./17,822.

HÆMORRHAGE in jaundice prevented by injection of 30 Cc. of 30% Aqueous Solution, 15 Cc. intramuscularly into each buttock.—M.P.C., Nov. 29/22,446.

Intramuscular injection of Sodium Citrate causes prompt reduction of coagulation time of blood. A 30% solution used, 15 Cc. being injected into each buttock, preceded by injection of Novocain.—B.M.J.E., ii./24,50.

Intravenously prevents hæmorrhages at operations or delivery and from mucous membranes, *e.g.*, epistaxis or metrorrhagia. Rise of vascular tension avoided by the following solution: Sodium Citrate 20, Magnesium Chloride 10, Water 100; inject 15 to 40 Cc.—per Jl. A.M.A., i./26,1170.

Malaria, amœbic hepatitis and relapsing fever treated with salts of organic acids, *e.g.*, citrates, tartrates or acetates. Suitable base, *e.g.*, Ammonium: stimulant, Sodium; non-toxic, to be taken into consideration. Their use advocated in practically all diseases due to protozoal parasites.—S. L. Rodrigues, M.P.C., Jan. 17/23,50.

SEA-SICKNESS well treated by rectal injections of Sodium Citrate, 1 drachm to the pint, repeated according to retention and results. Also by the mouth from maximum dose of 1½ dr. every two or three hours downwards.—B.M.J. i./25,140.

Intramuscular injections of Sodium Citrate less dangerous than intravenous. —Per Jl. Trop. Med., June 1, '26,161.

Wright's Solution—Sodium Chloride 4, Sodium Citrate 1, Water 120. For sinus washing.—Pye's Surg. Handicraft.

Liquor Sodii Ethylatis (B.P., 1898).

Is prepared by dissolving Sodium 1, in Absolute Alcohol 20, keeping the latter cool by a stream of cold water; has Sp. Gr. 0·867, and contains 18% of C_2H_5ONa Rapidly becomes brown.

Uses.—Effective caustic for nævi and moles and lupus; also in hypertrichosis. Applied with a glass rod for 2 or 3 successive days.

No water should be allowed to touch the part.

Liquor Sodii Methylatis.

Is prepared on lines similar to the above, employing Methyl instead of Ethyl Alcohol. It is available containing 2, 5 and 10% of Sodium Methylate.

Sodii Ethylas in *dry* form is to be stored in sealed tubes.

Sodii Hydroxidum. Soda Caustica. NaOH=40·005.

Dose.—½ to 1 grain (**0·03 to 0·06 Gm.**) well diluted.

In coarse white powder, fused masses, or moulded sticks.

Sodii Iodidum. NaI=149·929.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

A white crystalline deliquescent powder, ***soluble*** 3 in 2 of water and 1 in 3 of alcohol 90%. Must be distinguished from the hydrous salt containing $2H_2O$, which crystallises from cold solutions.

Flavoring.—Glyl Amygdalæ Amaræ, Syl Cinnamomi.

Uses similar to those of the potassium salt *q.v.*

Incompatible with Bismuth Salts, Ferric Salts, Strychnine, Spirit of Nitrous Ether (unless made alkaline) and with Quinine Sulphate—*cf.* Potassium Iodide.

Mediastinal growths. Sodium Iodide 2 or 3 grains with 5 to 7 grains of Chloral every 3, 4 or 6 hours relieves the dyspnœa. The Iodide may have some effect in causing absorption,—not of the tumour, but of the adventitious materials about it, while the Chloral acts as sedative and antispasmodic.—Pr., May, 1911, p. 605

In the routine treatment of chronic rheumatism, full doses of Sodium Iodide with Guaiacum give good results.

Goitre is thought to be due to LACK OF iodine in food or water. At Rochester, New York, 20 parts of Iodine in the form of Sodium Iodide has been added to every billion parts of tap water twice a year for two weeks in the hope of supplying to the human system and the thyroid gland the needed element to prevent goitre in young children. It has been suggested to use sea water in place of common salt. See also **Potassium Iodide,** pp. 714, 918.

In ASTHMA, 1 to 2 Gm. in 10 to 20 Cc. of water has been advocated *intravenously.*—B. R. Lœwy, Am. Jl of Clin. Med., May 1021.

SYPHILIS OF THE CENTRAL NERVOUS SYSTEM.—Injection of Sodium Iodide solution 10%, from 10 to 100 Cc., seemed to have beneficial effects. The dissolving of Salvarsan substitutes in Sodium Iodide solution is suggested.—Jl. Ph. & Exp. Ther., June '26,355.

Sodium Chloride and Sodium Iodide are practically of similar toxicity intravenously, and are almost twice as toxic as Sodium Bromide.—D. Loeser and A. L. Konwiser, Jl. Intrav. Therap., Jan. '26,7.

P1 **Mistura Sodii Iodidi Composita.**

Dose.—1 drachm (**4 Cc.**) thrice daily for an adult.

Sodium Iodide ½ drachm, Sodium Benzoate 3 drachms, Arsenical Solution ½ drachm, Tincture of Pulsatilla 1 drachm, Tincture of Baptisia 3 drachms, Syrup of Orange 1 ounce, Chloroform Water to 8 ounces.

In tuberculosis of every variety J. Laird has found this mixture of service. Calcium Salts in large quantities also essential, and in surgical cases lint moistened with a solution of Tincture of Iodine and covered with oil-silk to be applied.—'Notes on the Treatment of Tuberculosis: Preventive and Curative.'

Sodium Iodide as Pyelographic Medium.

U.C.H. has a Solution of Sodium Iodide 15 Gm. in distilled water to 50 Cc.

Sodii Nitras. $NaNO_3 = 85{\cdot}005$. *Dose.*—5 to 15 grains (**0·3 to 1 Gm.**).

Saline, refrigerant, diuretic.

Sodii Nitris, $NaNO_2 = 69{\cdot}005$.

Dose.—1 to 2 grains (**0·06 to 0·12 Gm.**).

Is obtained by reduction of Sodium Nitrate by fusing it with lead.

In white, deliquescent, crystalline granules, or in sticks, with a cooling saline taste, soluble 2 in 3 of water; useful in angina pectoris and in epileptiform convulsions,—action similar to amyl nitrite.

Compressed Tablets 2½ grains each, are prepared.

For asthma 3 to 5 grains frequently repeated; specially useful with hyoscyamus.—L. i./90,240.

"Sterules," Hypodermic, 1 Cc. containing ⅙ grain (**0·01 Gm.**). ⅓ grain (**0·02 Gm.**), and ¾ grain (**0·05 Gm.**) are prepared.

Even ⅛ grain distinctly affects the circulation, yet large doses do not cause death.—D. J. Leach.

The modern treatment of high tension by nitrites had been recommended in the time of Queen Elizabeth—nitre and blood-letting were advocated to prolong life—the nitre contained nitrites.

In granular kidney valuable. High tension of the pulse is natural to the disease.

Raised arterial tension when dangerous is well treated by ½ grain doses, gradually increased to 4 or 5 grains.

See also **Pulvis Potassii Nitritis Compositus** and **Pulvis Sodii Nitritis Compositus.**

Tablets of Sodium Nitrite ½ grain, with **Sodium Iodide** 3 grains, also prepared 1 grain with 5 grains. To ward off attacks of asthma 1 every 2 or 3 hours. In attacks of paroxysmal pain, in aortic insufficiency Sodium Nitrite 2 grains with Sodium Iodide 3 grains thrice daily afford great temporary relief.—Yeo.

Tabellæ Sodii Nitritis Compositæ (*G. Oliver*).

Dose.—One or more as required.

Sodium Nitrite ½ grain, Erythrol Nitrate ⅛ grain, Mannitol Nitrate ¼ grain, Ammonium Hippurate 1 grain.

A combination of the slowly acting vasodilators of some promise.—G. Oliver, Studies in Blood-Pressure.

Poisoning of an infant by taking 3½ grains Sodium Nitrite misread for Sodium Citrate, L. ii./17,162.

Amyl Nitrite and Sodium Nitrite raise the pulmonary pressure in dogs, and large doses of the latter often produce a rise of both carotid and pulmonary pressures with cardiac irregularities, sometimes terminating in ventricular fibrillation.—Jl. A.M.A., ii./25,929.

Sodii Phosphis.—$Na_2HPO_3+5H_2O=216{\cdot}109$, white crystalline powder soluble in water.

Sodii Phosphas Neutralis. *Syn.* TRIBASIC SODIUM PHOSPHATE. $Na_3PO_4+12H_2O=380{\cdot}21$.

Used for softening water and for boilers, preventing incrustation.

Soluble in water with alkaline reaction, dissociation giving Sodium Hydrate.

Sodii Phosphas (*B.P.* '14). *Syn.* HYDROGEN DI-SODIC PHOSPHATE; TASTELESS PURGING SALT. Na_2HPO_4, $12H_2O=358{\cdot}221$. Ph. Ned. V. has $2H_2O$.

Dose.—¼ to ½ ounce (**8 to 15 Gm.**) or 30 to 120 grains (**2 to 8 Gm.**) repeated. Colourless crystals or white granules.

Soluble 1 in 7 of water, is very efflorescent, loses 63% of its weight when heated to dull redness. Has an alkaline reaction.

Flavoring.—It is practically tasteless.

A mild aperient, well suited for a delicate stomach; small doses antacid and diuretic, useful in bilious sick-headache and jaundice.

For hepatic calculi, 60 grains 3 times a day, with $\frac{1}{20}$ grain sodium arsenate added, is given if any evidences of gastric intestinal catarrh.

Fireproofing.—Fairly concentrated solutions of sodium phosphate, ammonium phosphate, sal ammoniac, or sodium tungstate (20%) are all useful.

Dry Powder Fire Extinguisher.

Sodium Chloride 15, Ammonium Chloride 15, Sodium Bicarbonate 20. Mix and pack in thin glass vessels readily broken on throwing into fire.—P.J., ii./25,393.

✶ **Nuf** (T.M. 470152, Class 47). A white powder recommended for cleaning purposes was found to consist of Sodium Phosphate in a partly effloresced state. Stated to be a natural product.

odii Phosphas Effervescens (**Martindale**).

Dose.—1 to 3 drachms (**4 to 12 Gm.**).

A convenient and pleasant mode of taking this useful purgative. ntroduced by W. Martindale, and subsequently included in *B.P.* '98.

In exophthalmic goitre and neurasthenia of value.

As nervine tonic in stomach dilatation—must be persevered with.

Vescettes ' of Sodium Phosphate. 30 grains.

Dose.—1 to 6 crushed and taken in a draught of warm water.

odii Phosphas Exsiccatus. $Na_2HPO_4 = 142{\cdot}029$.

Dose.—10 grains to 2 drachms in some warm liquid.

odii et Ammonii Phosphas. *Syn.* MICROCOSMIC SALT.

$Na(NH_4)\ HPO_4 + 4H_2O = 209{\cdot}136$. Used in chemical analysis vith the blowpipe and for estimation of Magnesium.

odii Phosphas Acidus (*B.P.* '14). **Dihydrogen Sodium Phosphate** $NaH_2PO_4 + H_2O = 138{\cdot}056$.

Dose.—30 to 60 grains (**2 to 4 Gm.**).

Crystals soluble about 1 in 1 of water, and 1 in 300 of alcohol 90%. The *B.P.* '14 Salt is 70% pure. Is given in alkalinity of urine with good results. Particularly useful in cystitis, and after operations on the bladder to keep the urine acid. If diarrhœa occurs, stop its use for a time.

Passage of a calcium oxalate stone may be assisted by employing this salt owing to its solvent action on calcium oxalate. The salt given by the mouth s eliminated as such. Two ounces per diem in 100 ounces of distilled water were administered, and in six weeks no symptoms of stone remained, yet no alculus was passed—the stone was dissolved. The solvent action can be lemonstrated *in vitro.* The same treatment is advised in cases of Calcium Oxalate deposit without stone formation,—should be given from time to time o prevent concretion.—B.M.J. ii./09,1347.—P.R.S.M.Med. Sect., 1909, p. 1 *et seq.*

Given by the mouth will convert an alkaline urine into an acid one or increase acidity if already so. Acidity excepting in case of *B. Coli*, and *Staphylococcus* means lessened bacterial growth.—P.J. ii /11,16.

Mistura Sodii Acid-Phosphatis L.H.

Dose.—½ ounce (15 Cc.).

Sodium Acid Phosphate 30 grains, Red Mixture ¼ ounce (Mistura Rubra L.H. Fuchsin $\frac{1}{1000}$ grain, Water ¼ ounce).

Mistura Sodii Acid-Phosphatis Composita L.H.

With each dose of the previous, patient to take Hexamine 5 grains.

Regarding the latest theories of Hexamine Administration see Hexamine.

Mistura Antiseptica. Liverpool Royal Infirmary Pharm. (1922).

Dose.—Half ounce, well diluted with water.

Sodium Acid Phosphate 20 grains, Hexamine 10 grains, Syrup 20 minims, Water to half ounce.

Sodii Sesquiphosphas. $Na_3H_3P_2O_8 = 262{\cdot}069$.

Average dose.—30 grains (**2 Gm.**) *pro die* in divided doses.

This salt may be considered as a combination of equimolecular proportions of the Ortho-phosphates,—Na_2HPO_4 and NaH_2PO_4. It is virtually neutral to both blue and red litmus. It distinguishes itself as an Ortho-phosphate Compound by not coagulating Albumin, and by yielding a yellow precipitate with Silver Nitrate Solution. *Soluble* with ease in water.

Joulie employs this salt where the 'Ratio of Phosphoric Acid' is deficient and the 'Ratio of Acidity' is normal. It is not at all objectionable to the taste. Hyper-acidity will rapidly yield to the ordinary Sodium Phosphate .g., in the form of Effervescent Sodium Phosphate, *q.v.* *See also Vol. II.*

Sodium Silicate, Solution of. *Syn.* SOLUBLE GLASS, Water Glass. $Na_2SiO_3=122{\cdot}054$ (+Aq.)

A viscid solution, of the consistency of treacle, usually containing 10% of caustic soda and 20% of silica. **Liquor Natrii Silicici** P.G. VI. has Sp. Gr. 1·296 to 1·396. The solution will arrest the putrefaction of organic matter. In powder form this silicate is used medicinally in France, but both it and Silica *vide infra* would appear to be unsuitable chemicals for use *per os.*

SENILE PRURITUS well treated by intravenous injections of Sodium Silicate, each injection representing 0·01 to 0·02 Gm. of the pure Silicate. From 8 to 12 injections necessary, given at intervals of 2 or 3 days.—B.M.J.E., i./26,64.

SKIN DISORDERS, such as psoriasis, furunculosis, and acute weeping eczema, arteriosclerosis, tuberculosis of the lungs, stenosis of the cardiac valves, well treated with Sodium Silicate. It is best given intravenously, 1 Cc. of 1% solution, on alternate days, up to 15 or 20 doses, but Silica may also be administered hypodermically or *per os.*—L. ii./25,392.

Silica (Silicic Acid). Pills containing 1 grain with Morphine ⅛ grain also lozenges containing 1 grain with Sugar basis in cancer.—Battye. Edin. Med. Jl., 1874,420; Pres., 1912,298

Potassium Silicate, Solution of. Variable amounts of $K_2SiO_3=154{\cdot}352$ and $SiO_2=60{\cdot}06$. *Syn.* SOLUBLE GLASS.

Is less viscid than the Sodium compound and is also used to impregnate bandages for treating fractures. This was the original preparation of the two.

Salufer. A mixture of Silicofluorides used in the moist treatment of wounds. There is no fear of absorption.

Sodium Silicofluoride. $Na_2SiF_6=188{\cdot}054$.

A white crystalline powder only slightly soluble in water.

Two fatal cases of poisoning. Sodium Silicofluoride is commonly sold as an *insect powder.* Half a spoonful, taken in mistake for Carbonate, caused death in 10 hours. **Hydrofluorsilicic Acid** is used as sterilising agent for pipes, etc., in breweries. Fluorides and Fluosilicates added to schedule of poisons in Prussia.—Chem. Zeit., '25,805, per Analyst, '26,99,313.

Silicosis. Calcium Chloride and hydrated soluble Silica—two common constituents of the soil—have the property that, when either of them is injected with tetanus spores under the skin of a mouse, they provide the necessary condition for the germination of the spores and the production of the disease. The presence of Silica in the lungs leads to fibrosis and predisposes to consumption. Wrapped up in this is the possibility of new light on the problem of consumption which is a scourge of tin miners, gold miners, etc.—H. H. Dale, L. ii./21,112.

Silicosis and tuberculosis of lung. Phthisis found to be specially prevalent in the boot and shoe trade. The general conclusion is that Silica has no influence on the high phthisis rate found in this and in the printing trades.—R. Pratt, L. i./22,761.

Dust inhalation and pulmonary disease. Diminution of chest expansion occurs amongst workers exposed to silica dust. 7·07% of wet sandstone hand-grinders (with their special exposure to silica dust) gave definite evidence of tuberculosis. Results of examination of 1153 workers.—L. ii./23,470.

Industrial tuberculosis and factory ventilation, with special relation to inhalation of silicious dusts.—C. A. Winslow, Jl. A.M.A., ii./25,968.

Glass for Technical Purposes. *The British Science Guild* issued a Report regarding manufacture of Optical instruments. The *Glass Research Committee* of the Institute of Chemistry provides formulas for laboratory glassware. Valuable formulæ for soft glass, resistant glass, combustion tubing glass (=Jena), miners' lamp glass, soft soda glass for tubing and X-ray bulbs etc., are provided.—C. D. Apl. 24, 15, p. 534.

✱**Calorex.** (T.M. 423870, Class 15).—A roofing glass for absorbing heat consistent with transmitting a predetermined amount of light. Daylight glass also referred to. Optical Convention.—B.M.J. i./26,757.

Windolite.—A Cellulose and wire netting product allowing Ultra-Violet rays through freely. ✱ *Vitaglass* (T.M. 457402 Class 15) and 'Rest Light' are types of glass with similar properties.

The transparency of glasses to ultra-violet light.

The following percentage transmission was obtained. With no cover, 100; with Silica 0·11 inch thick, 85·7; with 'Vitaglass' 0·065 inch thick, 20·8-24·4; with window glass 0·082 inch thick, 3·1; with 'Calorex' glass 0·2 inch thick, none: and with non-actinic glass 0·2 inch thick, 0·4. Results bear out the claims made for the materials.—B.C.A., '27,323.

Sodii Persulphas, Sodium Persulphate. $Na_2S_2O_8=238{\cdot}122$.

Dose.—1 to 3 grains in water before meals.

In small white granular crystals, soluble in water. In tuberculosis and chlorotic and neuropathic subjects stimulates appetite. Useful in hyper-acid dyspepsia at the onset, also in gastric cancer. A strong oxidising and bleaching agent.

Liberates about 13% active oxygen. If it is desired to avoid production of free sulphuric acid, the persulphate may be mixed with 1¼ times its weight of Sodium Carbonate. 3 to 10% solutions as gargle and dressing. Suitable for wounds requiring moist dressing and where disinfection necessary. For small ulcers may be used as dusting powder, with equal quantity of powdered talc. Odourless and non-toxic.

Tetanus treated by intravenous injection of fresh 5% Sodium Persulphate solution given—60 Cc. each day—preferably in 2 or more doses injected slowly, the injection taking some 5 minutes. A reaction often appears—nausea and vomiting for ½ hour. Three cases with good effect.—L. i./18,188.

For Ammonium and Potassium Persulphates, see Vol. II.

Sodii Sulphas Acidus. $NaHSO_4+H_2O=138{\cdot}085$. *Syn.* SODIUM BISULPHATE.

In crystals or in fused masses, is recommended to purify water which may have typhoid contamination; 15 grains to a pint of water destroys *B. typhosus* after 15 minutes contact, as also *B. enteritidis*, *Spirillum choleræ* and internal parasitic worms.

'Anti-Typhoid' Tablets (originally patented by S. Rideal), contained the equivalent of 7½ grains of active Sodium Bisulphate to dissolve in ½ pint of water

Nauheim Bath Salts are prepared with this Salt and Sodium Bicarbonate. The Nauheim Water contains in addition Sodium and Calcium Chlorides, *cf.* List of Mineral Waters.

Fused Sodium Bisulphate Tablets, 5 ounces and packets of Sodium Bicarbonate for making **Effervescing baths** were the subject of a patent now expired.

In hydropathic establishments according to Ph. Form. baths are prepared extemporaneously with the following (each quantity for 40 gallons at 98° F.):

No.	Sodium Chloride.	Calcium Chloride.	Sodium Bicarbonate.	Hydrochloric Acid.
1	4 lbs.	6 ozs.	None.	None.
2	5 ,,	8 ,,	None.	None.
3	6 ,,	10 ,,	6 ,,	7 ozs.
4	7 ,,	10 ,,	8 ,,	9¼ ,,
5	9 ,,	11 ,,	1 lb.	18½ ,,
6	11 ,,	12 ,,	1½ ,,	27¾ ,,

Effervescing baths are believed by many to have a more marked effect in lowering blood pressure than ordinary water at similar temperature.

Sodii Sulphas. GLAUBER'S SALT. $Na_2SO_4.10H_2O=322{\cdot}218$.

Dose.—¼ to ½ ounce, or 30 to 120 grains repeated.

The form known as '**Feathery Crystals**' is handy for dispensing. Soluble about 1 in 3 of water—also in Glycerin; insoluble in Alcohol.

Flavoring.—Glyl Vanillæ, Glyl Menthæ Piperitæ.

INFANTILE DIARRHŒA.—It acts as an antiseptic, as the diarrhœa disappears. The dose was insufficient to be aperient. About 6 grains initially for a baby under 6 months, increasing up to 1 drachm for adults every 6 hours in fennel water. Children over 6 months can take 10 to 20 grains without producing aperient action. The administration of saline laxatives simultaneously or previously delays the absorption of drugs, alkaloids etc.—Macht and Finesilver, L. ii./22,347.

Sodii Sulphas Exsiccatus. $Na_2SO_4.H_2O = 160·074$.

Dose.—½ to 2 drachms (2 to 8 Gm.).

On drying, Sodium Sulphate Cryst. loses about half its weight.

Sodii Sulphas Effervescens.—*Martindale.*

Dose.—A teaspoonful or more in half a tumbler of water, taken half an hour before breakfast is an efficient evacuant.

Sodii Magnesii Sulphas Effervescens,—*Martindale.*

Dose.—A teaspoonful or more in half a tumbler of water taken half an hour before breakfast.

These aperients are palatable and convenient to use when travelling.

'Vescettes' of Sodio-Magnesium Sulphate. Each equivalent to 60 grains of the above, to be dissolved in a little warm water.

Sodium and Magnesium Sulphates are useful in clearing out the intestinal tract and lower the blood-pressure (in arteriosclerosis).

Sodii-Magnesii Sulphas Effervescens cum Caffeina.—*Martindale.*

Dose.—One teaspoonful or more.

A useful "pick-me-up," and for headaches.

'Vescettes' of this preparation contain 60 grains.

Chloro-Sodio-Magnesian Aperient.—*Martindale.*

Dose.—A teaspoonful or more.

An efficient saline purge, useful in migraine and other forms of headache; also in constipation, and for assisting digestion and relieving depression by increasing the action of the liver, intestines, and kidneys, and promoting free excretion of waste products.

The activity and palatability of the last five preparations may be increased, especially in winter, if taken in *warm water.* The combination of the salts of sodium and magnesium makes a more active purgative, but the effervescent sodium sulphate alone is more pleasant.

Sal Carolinum Factitium, P.G. VI., Ph. Ned. V., Artificial Carlsbad Salt. *Dose.*—20 to 60 grains (1·3 to 4 Gm.) in warm water. Dried Sodium Sulphate 22, Potassium Sulphate 1, Sodium Chloride 9, Sodium Bicarbonate 18, all in fine powder. Mix. 6 Gm. per litre or 53 grains to 1 pint of water is similar to Carlsbad Water.

Marienbad Salt is similar. **Marienbad Salt Tablets** may be prepared containing 60 grains of the mixture.

Marienbad Antiobesity Tablets. *Dose.*—One or two at bedtime. Aloes ½ grain, Rhubarb 1 grain, Cascara Extract ½ grain, Marienbad Salt ½ grain, Fucus Extract 1/6th grain.—P. J. F.

Note.—T.M.s ✱ 'Marienbader' No. 154288 and 154289 also 'Marienbader Tabletten' No. 242596 are on the Register.

'Vescettes' of Carlsbad Salts. Each equivalent to 2 ounces of Carlsbad-Sprudel Water.

Cavendish Water (*Martindale*).

Dose.—A wineglassful, diluted if preferred with a little warm water, ½ hour before breakfast.

Contains Sodium, Magnesium and Potassium Sulphates, also Sodium and Potassium Chlorides in a slightly effervescent Solution.

Aqua Dissocians.

Dose.—¼ of a glassful—diluted preferably with distilled water to a glassful—in the morning.

This water is not purgative. It depends for its action upon the property of chemical dissociation of the contained salts which include the Chlorides of Sodium, Potassium, Magnesium and Lithium, together with Sulphates of Magnesium and Calcium and a minute quantity of Sodium Bromide. It is slightly chalybeate and resembles chemically many mineral waters.

Sal Emsanum Facticium, Ph. Ned. V.

Sodium Sulphate Exsiccated 10, Potassium Sulphate 10, Sodium Chloride 265, Sodium Bicarbonate 715. **Sal Hunyadi Janos Facticium, Ph. Ned. IV.** Desiccate Magnesium Sulphate 950 to 500, add Sodium Chloride 50, and Sodium Sulphate Exsiccated 450. **Sal Vichy Facticium, Ph. Ned. V.** Sodium Phosphate (cryst.) 20, Potassium Sulphate 50, Sodium Chloride 80, Sodium Bicarbonate 850.

Sal Wildungense Facticium, Ph. Ned. V. Potassium Sulphate 5, Calcium Carbonate 190, Magnesium Carbonate 190, Sodium Chloride 240, Sodium Bicarbonate 375. To make artificial Wildungen Water use 4·6 Gm. per litre. *Dose* of each.—20 to 60 grains (**1·3 to 4 Gm.**), increased as required.

Sodii Sulphis. $Na_2SO_3,7H_2O=252{\cdot}170$.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

Colourless efflorescent crystals (keep in stoppered bottles).

Soluble in water 1 in 2, in Glycerin 1 in 25; slightly in Alcohol 90%. Incompatible with acids. Antiseptic.

In dilatation of the stomach the late Sir Wm. Broadbent recommended as antiseptic treatment Sodium Sulphite 5 to 10 grain doses, with sodium bicarbonate and nux vomica between meals.

As a lotion for skin affections and sores of the mouth, and internally for *sarcinæ* in the stomach.

Sodii Sulphis Exsiccatus contains about 90% $Na_2SO_3=126{\cdot}058$. Is used in photography. Being in dry powder is convenient for transit.

Sodii Sulphis Acidus. *Syn.* SODII BISULPHIS. $NaHSO_3=104{\cdot}069$.

Dose.—5 to 30 grains (**0·3 to 2 Gm.**).

White powder soluble 1 in 4 of water. Incompatible with acids. Has antiseptic properties. In stomatitis and skin affections.

FLAT WARTS of young people disappear in a week by bathing twice daily with solution of Sodium Bisulphite, adding sufficient water to allow only slight irritation.—E. Maigre, Comptes Rend. Soc. de Biol., '26,94,118, per Pres., Oct. '26,365.

Sodii Metabisulphis. *Syn.* SODIUM PYROSULPHITE. $Na_2SO_3SO_2 =190{\cdot}122$. Made by passing Sulphur Dioxide into a hot concentrated aqueous solution of Sodium Sulphite.

Suggested Dose.—2 to 5 grains (**0·12 to 0·3 Gm.**).

Sodium Metabisulphite 20 grains, Alcohol 90% 1 ounce, Peppermint Oil 5 minims, Glycerin 2 ounces. Has been used as an antiseptic throat pigment. It is said to be a specific to kill yeast fungus in the intestines. In photographic use is similar to the Potash Salt, *q.v.*

Sodii Sulphidum, $Na_2S,9H_2O=240{\cdot}202$. Yellowish deliquescent crystals soluble in water. Employed in skin affections.

A 25 to 40% Aqueous Solution as depilatory.

In surgery a mixture of this, cold-water, starch and fine unslaked lime is used as a depilatory.—A. Don, L. ii./15,339.

Balneum Sulphuris Alkalinum (see also p. 799).

Sodium Sulphide 2 ounces, Sodium Chloride 2 ounces, Sodium Bicarbonate 1 ounce. To be added to 50 or 60 gallons of hot water.

Soda Tartarata. **Sodii et Potassii Tartras.** (*B.P.* '14). ROCHELLE SALT, SEIGNETTE SALT. $(CHOH)_2.COONa.COOK+4H_2O=282{\cdot}189$.

Dose.—120 to 240 grains (**8 to 15 Gm.**). Colourless crystals.

Soluble 1 in 1½ of water.

Also in Alcohol 20% (Wt.) at 25° C. 1 in 2·82, 50% 1 in 40·7, 70% 1 in 332·4, 80% 1 in 1665.—Seidell.

Flavoring.—Syl Lavandulæ, Syl Rosæ; Syrupus Aurantii.

Pulvis Sodæ Tartaratæ Effervescens (*B.P.* '14). *Syn.* **Seidlitz Powder.**

Sodium Potassium Tartrate, in dry powder, 120 grains. Sodium Bicarbonate, in dry powder, 40 grains, in the blue paper. Tartaric Acid, in dry powder, 40 grains, in the white paper. *B.P.* '14 states approx. these figures in metric terms. 'EXTRA STRONG' (3 drachms Rochelle Salt) and '**Double Strength**' (4 drachms) are also supplied.

'**Alkaline' Seidlitz Powders** are made with additional 60 grains of Sodium Bicarbonate.

Seidlitz-powder in Italy is composed of magnesium sulphate 15, sodium bicarbonate 2, tartaric acid 2.—Ph. Notes.

Pulvis Effervescens Compositus, U.S. X. is similar to Seidlitz Powder B.P.

Sodii Tartras (Neutrale). $(CHOH.COONa)_2\ 2H_2O=230{\cdot}058$.

Dose.—As aperient ½ to 1 ounce. Diuretic, 15 to 60 grains repeated. White crystalline powder comparatively tasteless. Soluble in water 1 in 2. Relaxes the bowels and increases the flow of urine.

Sodii Sulphocyanidum. *Syn.* SODIUM RHODANIDE, SODIUM THIOCYANATE. $C \vdots N.S.Na=81{\cdot}069$.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

A crystalline colourless salt, soluble in water 1 in 0·3, and 1 in 0·6 of Alcohol 90%. It has a sedative action on the nervous system, is an analgesic and may be found useful in nervous affections, arterial sclerosis, and chronic nephritis.

Favourable effect on pains of tabetics and in angiospastic migraine has been reported.

Sodium, potassium and ammonium thiocyanates were tested on rabbits and other animals. No hydrocyanic acid was split off, and these salts did not act as poisons.—J.C.S.A. ii./12,668.

ARTERIAL HYPERTENSION.—Sodium Sulphocyanate remarkably effective in reducing. A teaspoonful of 8% solution (=5 grains), preserved with a little Phenol, well diluted with water three times daily after meals.—J. B. Nichols, Am. Jl. Med. Sci., Nov. '25,735., per Pres., July '26,278.

Sodii Taurocholas, $NaC_{26}H_{44}NSO_7=537{\cdot}421$.

Dose.—2 to 6 grains (**0·12 to 0·4 Gm.**), in pill, keratin-coated to prevent solution until it reaches the bowels. A whitish powder, prepared from pig's bile, ***soluble*** about 2 in 1 of water. It has been recommended for gouty obesity and dyspepsia.

Sodii Glycocholas. $NaC_{26}H_{42}NO_6=487{\cdot}341$.

Dose.—2 to 6 grains (**0·12 to 0·4 Gm.**)

A similar salt, soluble 1 in 2 of water and 1 in 3 of alcohol 90%, which appears to be a useful cholagogue for congestion of the liver, gallstones, constipation and melancholia.

These salts produce slight fall of blood pressure, the taurocholate more than the glycocholate.

Bile salts are the only certain cholagogues.—Sir Humphrey Rolleston, L. i./25,1207.

PEDICULOSIS. Bile Salts assist oily emulsions to penetrate shell of louse's egg. Sodium Taurocholate 10 Gm., Oleum Eucalypti 50 Cc., Water to 1,000. Solve the Taurocholate in water, add the oil and shake well. This emulsion is well rubbed into the head to wet the hair completely. Wrap in cap or towel. Wash with soap and water next morning, and a fine tooth comb to be used daily for a fortnight.—B. A. Peters.

Prophylactic in gonorrhœa. Bile Salts prevent growth in *vitro* (Castellani). A solution of Sodium Taurocholate 2 to 4 Gm. in Glycerin 30 Gm. to be applied to the meatus and over the glans before coitus.—Pres., Feb./21,77.

Infantile marasmus well treated by Bile Salts (increasing fat assimilation). Average dose ¼ grain of the mixed Sodium Glycocholate and Taurocholate for infants of three months.—E. F. Kerby, L. i./21,272.

Bile Salts have been used locally to the conjunctiva.

Cholalic Acid. *Syn.* ✱COLALIN. (T.M. 271422): CHOLIC ACID. $C_{24}H_{40}O_5=408{\cdot}3$.

An active constituent of bile in amorphous yellowish powder. ***Soluble*** in alkalis, particularly caustic potash, and in alcohol about 1 in 1; insoluble in acids, ether, and water.

Colalin Tablets (⅛ and ½ grain in each. *Dose.*—One three times daily before food) also contain a little magnesium carbonate.

Uses.—Stimulates the liver and increases flow of bile. Has slight depressant action on heart. Soluble in the alkaline juice of the small intestine—not dissolved in the stomach. For biliousness, melancholia, recurrent sick-headache and intestinal indigestion.

Should the substance constipate due to the action the bile has on absorption of fats, **Colalin Laxative** should be administered. Colalin combined with the principles of Cascara. **Tablets** contain 1⅛ grain each. *Dose.*—One thrice daily.

✱Felamine (Tablets) (T.M. 396797).

Dose.—In acute cases, 1 to 3 tablets thrice daily. For prolonged treatment, one tablet thrice daily.

Each tablet contains 0·3 Gm. of the Hexamine salt of Cholic Acid with slight excess of Hexamine.

Cholagogue, biliary antiseptic and laxative. Used in cholelithiasis, cholangitis, cholecystitis, hepatic insufficiency and chronic constipation.

Desoxycholic Acid. $C_{24}H_{40}O_4=392{\cdot}32$.

Manufacture. Obtained by reducing Cholic Acid (*Syn.* Cholalic Acid), $C_{24}H_{40}O_5$ with Zinc and Acetic Acid. W. Mair (Report from Research Laboratory Metropolitan Asylums Board, London), Biochemical Journal, Vol. XI., No. 1, May, 1917, digests Ox Bile with Soda and throws out the Bile Acids with Acetic Acid (after first freeing from Silica by a sufficiency of Hydrochloric Acid). The Bile Acids are recrystallised from Glacial Acetic Acid repeatedly, using also 60% Acetic Acid in the later stages. The method gets rid of Cholic Acid and other impurities yielding the Desoxycholic Acid practically pure with melting point 172° to 173° C. 4 litres of bile yield from 30 to 40 Gm. The acid can also be made from Commercial Sodium Taurocholate on similar lines—the yield being about 5%.

Sodium Desoxycholate.

Spray Solution.—Sodium Desoxycholate 4, Quinine Hydrochloride 0·5 Glycerin 25, Water to 100. For septic throats.

Tablets.—Contain Sodium Desoxycholate 1 grain, Quinine Ethyl Carbonate 1/8th grain, Peppermint Oil 1/20th minim, Ammoniated Glycyrrhizin 2 grains. Also made with Flavine 1 in 1,000. For infected throats.

Bile salts appear to possess a solvent action on pneumococci, also on amœbæ and spirochætes. Sodium Desoxycholate was found to be 10 times more powerful than Sodium Cholate or Sodium Taurocholate. The addition of quinine enhances the action.—F. M. Wells, B.M.J. ii./17,6.

P1 SPARTEINÆ SULPHAS.

$C_{15}H_{26}N_2.H_2SO_4.5HO$=422.384 (water content varies). Fr. Cx. and **P. Jap.** III. (now omitted).

Dose.—¼ to 1 grain (**0·016 to 0·06 Gm.**) increased.

Fr. Cx.—*Max. single dose* ¾ grain, max. during 24 hours 4 grains.

The sulphate of a volatile liquid alkaloid, $C_{15}H_{26}N_2$=234·254, in colourless crystals. ***Soluble*** 3 in 2 of water, and about 1 in 6 of alcohol 90%. Obtained from the leaves and branches of Broom, *Cytisus scoparius.* This contains also a crystalline principle Scoparin.

Two new alkaloids found, one volatile like Sparteine, the other not.—A. Valeur, Compt. Rend. 1918, 167, 26, 162, Y.B.P. 1919, p. 10.

Ⓟ**Hypodermic Tablets** contain ½ grain (**0·03 Gm.**).

Ⓟ**Pills** contain ¼ grain (**0·016 Gm.**).

Properties and Uses.—Sparteine possesses little digitalis action; it acts like conine, atropine, curarine and cocaine, but feebly. In its resemblance to conine it acts on the central nervous system. Like atropine in paralyses the, vagus nerve but only in very large doses, and in these it paralyses the motor nerve endings so that in this respect it resembles curarine. It perhaps also paralyses the sensory nerves—when injected it anæsthetises like cocaine. —Gordon Sharp, P.J. i./16,348. Dr. Samuel Johnson passed 20 pints of urine in 24 hours after taking the infusion. In the past it has been given in morphine habit. In post-operative suppression of urine. *Large doses*—1 to 2 grains hypodermically every 3 to 6 hours—have been given.

The pharmacological action of Sparteine and related alkaloids.—R. St. A. Heathcote, Jl. Ph. & Exp. Ther., June, '26,431.

P1 **Oxysparteina,** $C_{15}H_{24}N_2O$=248·208 is an oxidation product of Sparteine.

Has been stated also to act as a cardiac stimulant. The **Hydrochloride and Sulphate** are prepared.

Scoparin $C_{20}H_{20}O_{10}$, a neutral soluble phenol principle allied to the glucosides. *Dose.*—½ to 1 grain (**0·03 to 0·06 Gm.**). This other constituent of broom acts as a true diuretic on the kidney tissue proper, and it also acts as a diuretic in virtue of its digitalis-like action on the heart muscle.

P1 **Sparteine Periodide.** $C_{15}H_{26}N_2.3I$=615·02.

Dose.—½ to 1 grain (**0·03 to 0·06 Gm.**), increased if necessary. We know of 3 grain doses having been given under a prescription.

When made by interaction of Sparteine and Iodine in suitable solvent (*cf.* Alkaloidal Periodides) this compound is obtained in black crystals containing 38% of Sparteine.

Pharmacology. On treatment with Physiological Acid, it is to a large extent split up (12·4% of the Periodide is liberated to this solution), while subsequent treatment with Physiological Alkali liberates only a small amount.

No discomfort caused and no untoward symptoms observed from ¼ and ½ grain doses.

Solubility.—Soluble in Chloroform, slightly soluble in Alcohol, insoluble in Ether and water.

Uses.—May prove of service as a new method of giving the active principle of Broom as diuretic.

Dispensing Note.—To be given alone, in cachet or 'slipule,' preferably after meals.

SPHAGNUM.

TURF MOSS or BOG MOSS.

Botanical.—There are numerous varieties of Sphagnum indigenous to Great Britain. Large tracts of it are found in Scotland, the English lakes, Dartmoor and in Ireland.

We are indebted to Mr. E. M. Holmes for the following notes on a mixture of Sphagnum sent to him for botanical diagnosis :—

The large concave leaved plant is *Sphagnum Cymbifolium*. *S. Papillosum* is only distinguishable under the microscope from it. *S. Cuspidatum* has long tapering branches and narrow tapering leaves and grows *in* water. *S. Acutifolium* is small, usually in compact tufts with small leaves of various tints. The other common species are mostly intermediate in character; *S. Contortum* like a small *Cymbifolium* with curved rather stiff branches, *S. Reflexum* with flat edged leaves and *S. Squarrosum* with leaves bent back.

The plant consists virtually of a large collection of delicate resilient capillary tubes or perforated cells having the effect of a very fine sponge. These cells readily take in water and hold it firmly—the water can be squeezed out without the cells collapsing—(this is the case even after the application of hydraulic pressure—W. H. M.). In life the plant takes all its water from the atmosphere—it is not dependent on soil water.—Prof. I. Bayley Balfour, quoted by C. W. Cathcart, B.M.J. ii./15,137.

Chemical Examination.—An analysis by E. Treffner in 1881 of *S. Cuspidatum* showed it to contain 7·3% of substances soluble in water. Glucose is present to the extent of 3·05%, Saccharose 1·2% (—? W. H. M.), Chlorophyll 0·9%, Resin 0·7%, Albuminoid soluble in water 1·4%, Tannin and Mucilage traces, and Ash 1·9%. No evidence of Iodine.—P.J. i./16,125.

Uses.—For some years past the writer has advocated the use of dried sphagnum as *the* absorbent dressing *par excellence* for imbibing discharge of any description. It has no doubt been used for centuries by soldiers to staunch wounds in war. It was also brought into service by blast furnace workers as a protective against heat and as a dressing for burns. The plant in its dry condition will absorb upwards of 20 times its weight of water or discharge. For taking up urinary discharge in bladder, kidney and dropsical affections the material is pre-eminently suitable. The dressing is also useful as a bedding for insane persons.

Colin Campbell, Manch. Med. Soc., 1891, was an ardent user of moss. He pointed out that when cotton wool is placed in contact with a liquid, the fluid seems at once to seize it, its bulk becomes *diminished*, and its surface wet, each fibre having become saturated with the moisture. Moss, on the other hand, seizes the liquid; its bulk becomes rapidly and enormously *increased*. The absorbed liquid does not lie on the surface or between the fibres, but is shut up within the capillary cells of the moss : Thus, though it is full of liquid, *it does not feel wet*, and though it may be full of pus it appears clean.

One of the advantages of moss as an absorbent is that the discharge when absorbed by it *spreads—diffuses quickly in all directions* until the moss is all soaked, rendering it therefore more efficient as a dressing. Cotton wool has not this action—the absorption is relatively local—upwards from the discharging surface. Patients state that the dressing is cool while cotton dressings are not.

Moss dressings are cheap, deodorant and antiputrescent; hence they are invaluable as applications to foul ulcers or septic abscesses.

The dressing may be wrung out in antiseptic lotion equivalent to a 1% Lysol just prior to use, though a vast number of the moss dressings used in the war were not sterilised or treated with antiseptic in any way—and this in all probability without untoward infection of the wound.

Sublimated Moss contains 0·25% Mercuric Chloride (the proportion commonly used for sublimating cotton wool) The preparation of this involves soaking the dry moss in a sufficiency of Mercuric Chloride solution, pressing out excess and leaving in it enough of the solution to yield the stated proportion of sublimate on drying again. **Steam Sterilisation** is unsatisfactory.

The writer has had experience in the preparation of Moss Dressings both in the compressed form, and as muslin covered bags of convenient size for the use of the dresser; he started the industry in this country.

'Cavendish' Moss Sheets are of size 24 by 15 inches by $\frac{1}{8}$ inch approximately in thickness; two of these approximate 1 lb. in weight. They are handy for transit, a cwt. packing into a small case. In use the sheet is lightly broken up and teased out by the nurse and placed between folds of butter muslin or gauze. If desired, the entire dressing so made is rung out in antiseptic lotion—in many cases it will be satisfactory to slip the compressed dressing under the bed sheet as it is.

'Hallam' Moss. This is similar to the latter, the sheets, however, being more friable and thinner.

Gauze Covered Moss in the same size and sheet is also prepared ready for use.

Moss (Loose) **Dressings** in muslin bags size 12 by 8 inches, 10 by 6 inches, and 7 by 5 inches.

Moss Towels for menstruation are made, also **Moss Accouchement Sheets** 36 by 36 inches, and **Pillows** 18 by 18 inches.

Moss dressings are especially suitable for wounds suppurating freely. In such wounds the best results will be obtained when the moss is applied damp. A thin layer of gauze is wrung out of a warm antiseptic lotion and laid on the wound; over this, and overlapping it freely, are placed the damp bags of moss as required. After each bag has been wrung out of the warm lotion, the contained moss must be lightly opened out with the fingers; this is done easily owing to the elasticity of the material. Lastly, the bags are held comfortably in position with a bandage. This treatment of the moss-bags is recommended whether the dressings are in the loose or compressed form, and whether they have been sublimated or sterilised by steam.—C. W. Cathcart.

Sphagnum pads very useful, placed under wounds to collect excess of irrigant antiseptic in the Carrel Dakin method.—B.M.J. ii./17,597.

Sanodora Moss Sheets are impregnated with various essential oils: Bergamot, Birch Tar, Camphor, Clove, Citronella, Eucalyptus Citriodora, Lemongrass, Sassafras and Wintergreen. They are used for absorbing objectionable odours and perfuming the atmosphere in closets, cloak-rooms, kitchens, factories, warehouses, etc. They are of use as fly deterrents.

* 'STERULES.'

(T.M. 260408)

'Sterules' contain solutions made with special care for hypodermic, intramuscular and intravenous use; also for inhalation and ophthalmic and ionic purposes.

Hypodermic, Intramuscular and Intravenous Sterules are flask-shaped or with the two ends pointed.

Sterules for Inhalation are made of Amyl Nitrite, Aromatic Ammonia, Chloroform, Ether, Ethyl Iodide and its combinations and similar compounds. (*See individual headings.*)

Sterules of Dry Chemicals, *e.g.*, 'Mercurome,' and Tylcalsin, for making solutions extemporaneously, are also convenient.

The **Ophthalmic Sterule** is inserted through an **Ejector,** and its 'breech' end is snapped off at the file mark. It is drawn further through the ejector, held horizontally, and the other end is broken off at the file mark. The 'breech' end of the ejector is now covered with the index finger, and the soft part is pressed with the thumb and second finger to release a small quantity (sufficient for one application in eye work) of a *sterile* solution. The file marks are situated ¼ inch from the ends of the 'sterule.'

Ionic Sterules are for use in Iontophoresis, *vide* Iontophoresis Vol. II. For list of solutions in 'Sterule' form, *see* Index.

℗STRAMONIUM.

Dried leaves *B.P.* '14, and dried ripe seeds, B.P. '98, of *Datura Stramonium* (*Solanaceæ*). U.S. X. requires not less than 0·25% stramonium alkaloids in the leaves when assayed as for belladonna.

Fr. Cx. has max. single dose, 4 grains, max. dose during 24 hours, 15 grains approximately.

Uses.—Its action is similar to belladonna, and employed for the same purposes. Is a usual ingredient in cigarettes and the fumigating powders employed in asthma.

Parkinsonism well treated by Stramonium in pills or cachets, in progressively increasing doses of 0·05 or 0·10 Gm. to limit of tolerance; given preferably during meals. To avoid habituation, administer for 20 days with intervals of 10 days.—B.M.J.E. i./26,56.

In Spanish the plant is *Yerba de huaco*, 'Plant of the Graves.' The thorn-apple is used in South America in form of a drink which gives hallucinations in the nature of communication with the spirits of ancestors.—P.J. ii./12,686.

The leaves and seeds contain **Daturine,** which is identical with Hyoscyamine (*q.v.*) together with Hyoscyamine and Hyoscine.

Individual plants of *D. Stramonium* gave 0·47, 0·55, 0·52, and 0·46% Alkaloid and *D. Tatula*, 0·47, 0·63 and 0·65%, thus showing a marked variation.—Int. Cong., 1912.

Cultivation. The whole plant can be harvested with or without the root without fear of the total alkaloid content falling below 0·25%. —G. B. Koch, Am. Jl. Ph., January 1919, C.D. '19, 303.

Datura Metel Seeds from India contained 0·23% of total alkaloid consisting of Hyoscyamine and Scopolamine in proportion 2 : 1 together with a little Atropine. The capsules contained 0·1% of total alkaloid consisting of Scopolamine only.—P.J. ii./12,579, *see* also P.J. ii./05,230,617.

From the seeds of *Datura fastuosa var. Flor. coerul. plen.* which plant is said by many authorities to be identical with *D. alba*, Schmidt obtained Scopolamine 0·216%, Hyoscyamine 0·034%, and traces of Atropine. The var. *D. fastuosa flor. alb. plen.* gave slightly less of the constituents.

D. Alba, which grows wild in the Phillipines, as a source of Atropine and Hyoscyamine.—P.J. ii./16,297.

The leaves of *D. fastuosa v. alba* and *D. metel* as also seeds of the former are *B.P.* '14. Tincture of Seeds 1 in 4, Alcohol 70%. *Dose.*—5 to 15 minims.

Stramonium seeds contain about 15–30% of a fixed drying oil. The seeds and leaves have about the same alkaloidal strength—average 0·22%

A key for distinguishing various species of Datura.—H. A. Timmerman, P.J., i./27,574.

Honey collected by bees from *D. Stramonium* has been wrongly stated to be toxic. Observation showed that the flowers in question are not visited by bees. They are pollenated by night-flying insects with long proboscides—H. Deane, P.J. ii./13,134.

Datura ***poisoning*** is common in Cairo. Symptoms are those of Belladonna poisoning. Writer has never seen a fatal case though many remained on verge of death for hours.—L. ii./21,1065.

P 1 Extractum Stramonii (B.P., 1898).

Dose.—¼ to 1 grain (**0·016 to 0·06 Gm.**).

An extract of the seeds in No. 40 powder prepared with Alcohol 70%. U.S. X. Extracts (Pilular and Powdered) are assayed to 1% alkaloids. The average yield of extract from the leaves is 20%.

In spasmodic asthma the extract found better than the tincture. Sufficient should be given to be slightly toxic. Most patients show toxic effects on taking ¾ grain in 24 hours.—B.M.J i./09,788.

Ⓟ**Tinctura Stramonii** (*B.P.* '14).

Dose.—5 to 15 minims, 1 of leaves to 5 of 45% alcohol.

U.S.X. 1 in 10 of diluted alcohol standardised to 0·025% Alkaloids.

Ⓟ **Mistura Antispasmodica, N.H.W.** (not in E.G.A.). Tincture of Stramonium, Tincture of Lobelia (Ethereal), Tincture of Opium, of each 8 minims, Chloroform Water to ½ ounce. Ⓟ **Mistura Asthmatica, N.H.W.** (not in E.G.A.). Tincture of Stramonium, Tincture of Lobelia (Ethereal) of each 10 minims, Ether 15 minims, Potassium Bromide 10 grains, Chloroform Water to ½ ounce.

Ⓟ**Mistura Potassii Iodidi cum Lobelia. E.G.A.**

Dose.—½ ounce (15 Cc.).

Potassium Iodide 5 grains, Ethereal Tincture of Lobelia 10 minims, Tincture of Stramonium 10 minims, Spirit of Chloroform 10 minims, Water to ½ ounce.

STRONTIUM.

Sr=87·63.

Strontium is probably the most innocuous of the alkaline earth-metals. Its salts are relatively slowly absorbed.

Investigations at the Johns Hopkins University have shown that Strontium can be deposited in the bones with a resultant decrease of Calcium content. It is capable of transmission to the young from the mother and gives rise to a form of "Strontium rickets," which is not combatable with Cod Liver Oil. It is well to bear in mind its possible abnormal physiological behaviour. The entire abandonment of Strontium in therapy is suggested.—Jl. A.M.A., June, 1923, per P.J. i./23,573.

Strontii Bromidum (*B.P.* '14). *Syn.* KORONIUM (CORONIUM) BROMIDE.

$SrBr_2+6H_2O=355{\cdot}558$.

Dose.—5 to 30 grains (**0·3 to 2 Gm.**).

In deliquescent crystals, 97% pure with bitter saline taste, ***soluble*** in less than an equal quantity of water.

Flavoring.—Syl Lavandulæ, Syl Menthæ Piperitæ.

Used in gastric affections, dyspepsia, and vomiting of nervous origin; also in epilepsy instead of the Potash salt.

This salt may decolorise Compound Tincture of Cardamoms in a mixture. —P.J. i./14,670,698.

Tablets contain each 5 grains (0·3 Gm.).

Effervescent Strontium Bromide. *Dose.*—1 drachm (=10 grains).

'**Vescettes**' of **Strontium Bromide** contain 10 grains.

Strontii Bromidum Exsiccatum.

Dose.—4 to 24 grains (0·25 to 1·5 Gm.).

On drying Strontium Bromide it loses most of its water of crystallisation, 4 parts are about = 5 of crystals.

Strontii Carbonas. $SrCO_3 = 147{\cdot}63$.

Dose.—5 to 30 grains (0·3 to 2 Gm.).

Strontii Iodidum. $SrI_2 + 6H_2O = 449{\cdot}59$.

Dose.—5 to 20 grains (0·3 to 1·2 Gm.).

In white crystalline masses, freely soluble in water.

Exophthalmic goitre of children has been treated with this and the Bromide, also asthma, rheumatism, and chronic endocarditis.

Strontii Lactas. FR. CX. $(C_2H_4\,OH.COO)_2Sr + 3H_2O = 319{\cdot}758$.

Dose.—5 to 30 grains (0·3 to 2 Gm.).

A white crystalline powder, very soluble in water, of service in albuminuria and Bright's Disease. May be combined with iron in the albuminuria of pregnancy.

To increase coagulability of the blood 15 to 30 grain doses useful.

Tetany can be prevented or relieved by the continuous oral administration of Strontium Lactate. It acts by decreasing the permeability of the gut to Calcium excretion and by reducing the excitability of the motor nerves. —Am. Jl. Physiol., '26,75,378, per B.C.A., '26, A.318.

Strontii Salicylas, U.S. X. $[C_6H_4.OH.COO]_2Sr + 2H_2O = 397{\cdot}742$.

Dose.—5 to 20 grains (0·3 to 1·2 Gm.).

A white crystalline powder, slightly soluble in water and in alcohol.

Used for chronic gout, and a good intestinal antiseptic.

Intravenously, 10 Cc. of 5% solution, has proved useful in chronic affections of the joints. The lactate may be given orally, and, in severe pain, the bromide intravenously in place of the salicylate.—Per P.J., ii./26,287.

ⓅSTROPHANTHUS (*B.P.* '14). U.S. X.

The mature ripe seeds of *Strophanthus Kombé* (Oliver), (*Apocynaceæ*) freed from the awns, of a fawn colour, and covered with hairs. A section of the seed should give a green colour with a mixture of sulphuric acid 80 and water 20. *S. Courmontii* and several other species have been used as adulterants.

U.S. X. states *S. Kombé* 'or *S. hispidus*.' Assayed biologically.

P. HUNG. gives *max. single dose* ¾ grain (0·05 Gm.), max. in 24 hours 0·15 Gm.

Commercial History of (Holmes).—P.J. i./06,312.

S. Hispidus and *S. Kombé* are the only two species giving a green reaction with Sulphuric Acid. Buying the seed in the pod is the safest method.—G. Sharpe, P.J. i./16,347.

Strophanthus Preussii from the Southern provinces of Nigeria acts powerfully on the heart, and may have therapeutic value.—Karam Samaan, P.J. ii./22,83.

Antidotes to **Strophanthus preparations**—

After stomach pump or emetics give Tannin or Gallic Acid in water, followed by stimulants. Anæsthetics to relieve spasm. Potassium Permanganate has been recommended.

P1 Strophanthin. $C_{40}H_{66}O_{19}$=850·528. Fr. Cx.

P1 *Strophanthin and all other poisonous constituents of Strophanthus.*

Dose.—$\frac{1}{300}$ to $\frac{1}{100}$ grain (**0·0002 to 0·0006 Gm.**) hypodermically. **U.S. X. gives average daily dose, intravenously** $\frac{1}{120}$ grain. Is irritating at the site of injection.

Dose by the mouth 1 to 4 mgr. and up to 4 mgr. a day; by intramuscular injection 1 to 3 mgr. a day and by intravenous injection ¼ to 1 mgr. and up to 2 mgr. a day has been recommended. Given by the mouth it is often ill tolerated and strychnine (1 to 3 mgr. in the day) is the best antidote. Signs of overdose: headache, sense of tightness in the chest and præcordia, marked slowing or bigeminy of pulse, marked rise in blood pressure, cardiac arhythmia, insomnia, nausea are least seen with the intravenous use of the substance. Little success in heart affections obtained with the drug taken *per os.*

Contraindicated where there is a high blood pressure and marked arteriosclerosis and to those with acute or chronic nephritis or granular kidney.

Ⓟ **Sterules** containing **¼ to 1 mgr.** of **Strophanthin** in 1 **Cc.** for dilution to 10 Cc. are made.

A white glucoside, or "mixture of glucosides from S. Kombé" (U.S.). Soluble in water and alcohol 90%, allied in its physiological action to digitalin and of bitter taste. Fuses at 170° C

G. Cohn, writing on glucosides of the Digitalis group, differentiates 3 Strophanthins of commerce: H. Strophanthin $C_{40}H_{60}O_{16}$ from *S. hispidus* K. Strophanthin $C_{32}H_{48}O_{16}$ from *S. Kombe*, and G. Strophanthin $C_{36}H_{46}O_{12}$ + $9H_2O$, which is identical with Crystalline Ouabain.—Phar. Zentralh, per Y.B.P. 1913, 129.

The action of Strophanthin on cardiac tissue. Experimental work on the frog.—A. J. Clark, B.M.J. ii./13,897.

Strophanthidin.—A white crystalline substance very slightly soluble in water and Ether but easily soluble in Alcohol and Acetone. Obtained from Strophanthin Kombé by hydrolysis. Has marked emetic properties.—Jl. Ph. & Exp. Ther., Feb. '26,10.

Uses.—As a cardiac tonic and diuretic. Resembles digitalis in effects but acts far more promptly. It is stated that the Tincture acts in from ½ to 1 hour, while Digitalis Tincture takes from 24 to 48 hours. Occasionally of service where the latter has failed or is not tolerated. Especially valuable in mitral stenosis, but unsuitable in aortic disease; pulse improves in force and rhythm, dyspnœa and palpitation are lessened, appetite is increased, action of bowels and perspiration not affected—non-cumulative. Of value in renal insufficiency. It is a better diuretic than Digitalis because, while it accelerates the circulation, it does not readily constrict the arterioles.

In heart failure, *intravenous* injection of 8–12 minims of 1 in 1.000 strophanthin solution (½ to ¾ mgr. of the base) has been successful.

In urgent heart cases Strophanthin intravenously is of unmistakable value. —W. Gordon, B.M.J. i./21,13.

Strophanthus as diuretic *cf.* action of Digitalis, p. 393.

Caution.—To our knowledge the drug occasionally acts in an unaccountable manner—loss of consciousness has followed an ordinary dose in a weakened patient.

Ⓟ **Granules de Strophanthine,** Fr. Cx., $\frac{1}{10}$ mgr. and are coloured pink.

Ⓟ **Poudre de Strophanthine au Centième.** Fr. Cx. *Max. single dose* ½ grain, Max. during 24 hours 1½ grains approximately.

Ⓟ **Extractum Strophanthi** (*B.P.* '14).

Dose.—¼ to 1 grain (**0·016 to 0·065 Gm.**).

The seeds are first percolated with purified ether, and then with 90% alcohol; the alcoholic percolate concentrated and mixed with milk sugar, so that 2 parts of extract in powder= 1 part of seeds.

Ⓟ**Tinctura Strophanthi** (*B.P.* '14).

Dose.—2 to 5 minims (**0·12 to 0·3 Cc.**).

Prescribing Note.—It has been reported to us (1923) that a number of prescriptions containing *Tincture of Strophanthus* and Nux Vomica in mixture with Chloroform Water caused severe diarrhœa in nearly every case. There is a possibility of hydrolysis. The Tincture as 'Drops' would be preferable.

Strophanthus Seeds de-fatted with Ether in No. 30 powder 1, by percolation with Alcohol (70%) *q.s.* to 10. Is four times the strength of the B.P '98 preparation. This conforms with F.I. U.S. X. is 1 in 10 with Alcohol (94·9% Vol.), assayed biologically.

Fr. Cx. has F.I. strength with max. single dose 3 minims approx. Max. during 24 hours 12 minims approx.

The B.P. 1885 preparation was half the strength of the 1914. This gave good results in pneumonia—5 minim doses with the same amount of Capsicum Tincture.

Physiologically Standardised Tincture of Strophanthus.—Standards adopted vary with different makers. Some adopt M.L.D. 0·006 Cc., per 100 Gm. weight of frog. Strophanthus Tincture properly stored loses little in activity. See also Vol II.

Ⓟ**Fraser's Tincture of Strophanthus** is occasionally prescribed. This was a 1 in 20 preparation in Alcohol 90% made from the seeds, defatted with Ether. *Dose.*—5 to 15 minims.

For a note on the Chemical Assay of the seeds, also for other methods of making tinctures, see Vol. II.

Ⓟ**Tabellæ Strophanthi**, equal to 1 minim of Tincture (*B.P.* '14) combined with chocolate. *Dose.*—2 to 5. Ⓟ**Tablets**, Compressed, are also prepared equal to 2 and 5 minims of the Tincture.

Ⓟ**Tablets, Hypodermic,** contain **Strophanthin** $\frac{1}{500}$ grain.

P1 **Ouabain,** $C_{30}H_{46}O_{12}$ = 598· 18. A glucoside from Ouabaio wood obtained from a *Carissa sp.* of the same natural order as strophanthus, is in colourless lamels, slightly soluble in cold water, insoluble in absolute alcohol and ether, but soluble in glycero-alcohol (according to Schmidt 1 in 150 water at 11° C. and in 27 alcohol 85%). It gives a red colour with sulphuric acid and has similar properties to Strophanthin, but is much more toxic in action. Ouabain has been used for whooping-cough in doses of $\frac{1}{1000}$ to $\frac{1}{250}$ grain every three hours. Study of its physiological action.—B.M.J.E. i./92,27 It is also obtained from *Acocanthera species.*

P1 **Ouabain, Ph. Ned. V.,** has *Syn.* Strophanthin Cryst.

From *S. gratus* or from *Acocanthera* woods. M.pt. 185—188°.

1 mgr. heated with a solution of 50 mgr. Resorcin in 5 Cc. Hydrochloric Acid should give no red colour (other Strophanthins).

Ouabain indicated in certain cases of cardiac insufficiency, with acute dilatation of the ventricles, and tendency to trigeminal rhythm, which are not affected except unfavorably by digitalis. Give intravenously in four $\frac{1}{4}$ mgr. doses every four hours.—B.M.J.E. i./21,102.

Ouabain is indicated in heart affections when infection is absent or of secondary importance and cardiac dilatation predominates as in hypertension, arterio-sclerosis, renal sclerosis, valvular lesions and pericardial adhesions. May be used alone or in association with Digitalis. Daily dose $\frac{1}{4}$ mgr. repeated for 4 days or longer if necessary.—B.M.J.E. ii./21,77.

P1 STRYCHNINA (*B.P.* '14), Fr. Cx.

P1 *Preparations or Admixtures containing* 0·2% *or more.*

P1 *Applicable to Northern Ireland and Irish Free State also, and Salts of Strychnine.*

$C_{21}H_{22}N_2O_2$ = 334·192.

Dose.—$\frac{1}{64}$ to $\frac{1}{16}$ grain (**0·001 to 0·004 Gm.**). Fr. Cx.—*Max. single dose* $\frac{1}{12}$ grain. Max. during 24 hours $\frac{1}{4}$ grain approx. The alkaloid obtained from Nux Vomica, St. Ignatius' beans (*q.v.*) and the seeds of other species of *Strychnos.* In characteristic colourless crystals (not coloured by strong nitric acid: absence of Brucine). Exceedingly poisonous. Its absorption in the rectum is even more rapid than in the stomach, small intestine, œsophagus or colon.

It is supplied pink to cover brown tint forming in hot climates.

Soluble.—In water, 1 in 2,800 (according to our expts., 1924), about 1 in 400 of alcohol 60%, 1 in 150 of alcohol 90%, 1 in 400 of absolute alcohol, 1 in 6 of chloroform, nearly insoluble in ether.

Antidotes.—Apomorphine Injection or Emetics followed by washing out the stomach with Potassium or Calcium Permanganate solution 2 to 5 grains per pint, then give Potassium Bromide 4 drachm dose repeated in 2 drachm amounts every hour if necessary. Chloral in ½ to 1 drachm doses. ***Charcoal*** *ad lib* in water. Chloroform or Ether Anæsthesia. Amyl Nitrite and Paraldehyde. Art. resp.

Strychnine compares with Brucine in toxicity as 33 : 4.—Wright and Dixon.

Electricity as Antidote. Interesting account of the early use of Strychnine. Magical effect of 1/20th grain doses in a paralytic. Also action of magneto-electricity on a dog after 2 grains. *Similia similis curantur.* Relaxation of muscles at once. In human poisoning, if promptly used, it would save life.—J. Mackenzie, P.J. i./22,502.

Recovery of a dog poisoned by Strychnine, in which the animal was stiff and in *rigor mortis*, by applying Chloroform to its nostrils; the relaxation of its muscles permitted recovery.—U. Aylmer Coates, P.J. i./22,526. See also 'A.J.C.' *ibid*, 547.

J. P. Vaquier found guilty of murder of A. P. Jones at Byfleet. He had purchased 0·12 Gm. of Strychnine.—C. D. May 10 and July 12/24.

Fatal *Strychnine* poisoning of child from eating a few 'Iron and Arsenic' Tablets (Merck's Comprettæ). Strychnine content not indicated with sufficient clearness to attract attention.—D.M.W., per Jl. A.M.A., ii./25,232.

Flavoring.—For Strychnine Salts and preparations containing Strychnine, Syl Aurantii Amari, Syl Menthæ Piperitæ (very full dose).

P1 **Pilula Strychninæ** contains $\frac{1}{25}$ $\frac{1}{30}$ $\frac{1}{40}$ $\frac{1}{50}$ $\frac{1}{60}$ $\frac{1}{80}$ and $\frac{1}{100}$ grain.

P1 **Ferri et Strychninæ Citras,**

Average Dose.—2 grains (**0·12 Gm.**) in solution.

In scales varying in colour from garnet red to yellowish brown, freely soluble in cold water. It contains 1% of Strychnine, and Ferric Citrate corresponding to not less than 16% Metallic Iron.

P1 **Ferri, Quininæ et Strychninæ Citras.**

Dose.—3 to 6 grains (**0·2 to 0·4 Gm.**).

Similar to the former with about 15% of Quinine.

P1 **Strychninæ Arsenas.**

$C_{21}H_{22}N_2O_2.H_3AsO_4,\frac{1}{2}H_2O=485·184$.

Dose.—$\frac{1}{64}$ to $\frac{1}{16}$ grain (**0·001 to 0·004 Gm.**).

In small white acicular crystals containing 68·72% Strychnine, soluble 1 in 34 of water.

In phthisis by hypodermic injection of ½% mixture with liquid Paraffin. *Dose.*—4 to 15 minims daily.

In addition to this acid salt there is another of composition:—
$C_{21}H_{22}N_2O(H_3AsO_4)_2H_2O$. Soluble 1 in 16¾.—Dott, P.J. ii./11,173. It contains much less Strychnine (42·8%).

P1 **Strychnine Acetate** is soluble 1 in 44, the **Hydrobromide** 1 in 70, the **Hypophosphite** (one of the most soluble salts) 1 in 3·3.

Dose of each as for Hydrochloride.

P1 Strychninæ Hydrochloridum.

$C_{21}H_{22}N_2O_2,HCl,2H_2O=406·689$.

Dose.—$\frac{1}{64}$ to $\frac{1}{16}$ grain (**0·001 to 0·004 Gm.**).

Small trimetric prisms, soluble 1 in 35·5 of water (by our experiments); alcohol (90%) 1 in 73.

A 1% (w/v) solution is strongly hypotonic, 0·079 Gm. Sodium Chloride or 0·442 Gm. Glucose to every 10 Cc. renders it isotonic.

A case recorded where life was in danger, had $\frac{1}{80}$ grain doses increased to $\frac{1}{6}$ grain *pro die* in a month. A Chinaman with beri-beri (paralysis of) had up to $\frac{1}{4}$ grain *t.i.d.* Recovery in both cases.

P1 Liquor Strychninæ Hydrochloridi (*B.P.* '14).

Dose.—2 to 8 minims (**0·12 to 0·5 Cc.**).

Strychnine Hydrochloride 1, Alcohol (90%) 25, Water to 100.

For **hypodermic injection.** *Dose.*—2 to 6 minims.

Incompatible with *Liquor Arsenicalis*, alkalis, *e.g.* Sodium Bicarbonate, Sal Volatile, Bromides and Iodides.

A small quantity of Glycerin added in place of equivalent of the spirit prevents crystallisation of the salt round the neck of the bottle.

Jowett showed by experiment that it is safer to prescribe Tincture of Nux Vomica in preference to Solution of Strychnine Hydrochloride when there is danger of incompatibility. There appears to be something in the combination of the Strychnine in the Tincture which tends to hold it in solution even in the presence of alkali.—P.J. i./13,402. H. Finnemore arrived at similar conclusions.—P.J. ii./14,124.

P1 Injectio Strychninæ Hypodermica (*B.P.* '14).

Dose.—Hypodermically 5 to 10 minims (**0·3 to 0·6 Cc.**). Dissolve Strychnine Hydrochloride 0·75 Gm. in recently boiled and cooled Distilled Water 100 Cc.

Ⓟ **Mistura Strychninæ Phosphorica. R.N.H.**

Solution of Strychnine Hydrochloride 3 minims, Dilute Phosphoric Acid 10 minims, Syrup of Ginger 30 minims, Water to 1 ounce.

P1 Strychninæ Nitras, U.S., P.G. VI., P. Belg., P. Hung. *Dose.*—$\frac{1}{64}$ to $\frac{1}{16}$ grain (**0·001 to 0·004 Gm.**).

P. Hung. gives *max. single dose* $\frac{1}{6}$ grain (0·01 Gm.), max. in a day $\frac{1}{3}$ grain (0·02 Gm.). P.G.VI. gives half these amounts.

$C_{21}H_{22}N_2O_2.HNO_3=397·208$.

Colourless needles, soluble 1 in 60 of water; in 45 at 25° C. U.S.

P1 Tablets, Hypodermic, $\frac{1}{100}$, $\frac{1}{60}$, $\frac{1}{40}$, $\frac{1}{20}$ grain.

P1 Injectio Strychninæ, Arsenii Iodidi et Quininæ.—Strychnine Nitrate 1 grain, Arsenious Iodide 2 grains, Quinine Lactate 1 drachm, Distilled Water to 3 ounces.

Dose.—Up to 1 drachm hypodermically for adults.

Specific to reduce temperature in influenza attacks and almost any grave affection. Also prophylactic, *e.g.* in malaria.

P1 Kidd's, Dr., Strychnine Nitrate Solution 1 in 200. Various formulæ are provided. One is as follows:—Strychnine 1 grain, Distilled Water 45 minims, Strong Nitric Acid 5 grains, Alcohol (90%) $2\frac{1}{2}$ drachms. Rub the Strychnine with the water in a glass mortar. Gradually add the Spirit and when cold add the Acid. After standing some days it becomes pale lemon colour.—P.J. ii./12,604.

Tabellæ Nitroglycerini et Strychninæ, *v.* p. 578.

P1 **Strychninæ Periodidum.** $C_{21}H_{22}N_2O_2.2I=588·056$.

Dose.—1/100 grain (**0·0006 Gm.**) carefully increased, if desired.

Obtained by combination of Strychnine and Iodine in a suitable solvent as a dark red powder, containing about 56% of Strychnine.

Solubility.—Soluble in Chloroform, slightly soluble in Alcohol, insoluble in Ether and water. It splits up with Physiological Acid, liberating 13·6% of alkaloid, and a further 10% to Physiological Alkali.

Uses.—This novel form of the well-known alkaloid may be worthy of trial.

Dispensing Note.—To be given in form of *Levigations* (*q.v.*) in 'slipule' (No. 5) or cachet.

P1 **Strychninæ Sulphas,** U.S. X. Fr. Cx. $(C_{21}H_{22}N_2O_2)_2H_2SO_4+5H_2O=856·544$.

Dose.—$\frac{1}{64}$ to $\frac{1}{16}$ grain (**0·001 to 0·004 Gm.**). Fr. Cx. *Max. single dose* $\frac{1}{10}$ grain; max. during 24 hours $\frac{1}{4}$ grain approximately.

The neutral salt is in prismatic crystals, soluble 1 in 62 of water; M.Pt. 200° C. It contains $5\frac{1}{2}H_2O$; *i.e.* there is usually a loss on drying of 11·44% approx.—Dott., P.J. i./12,425.

P1 **Hypodermic Injection** 1 in 100. *Dose.*—1 to 6 minims.

P1 **Tablets,** $\frac{1}{60}$, $\frac{1}{50}$ and $\frac{1}{30}$ grain each, for administration *per os.*

P1 **Hypodermic Tablets** $\frac{1}{100}$, $\frac{1}{60}$, $\frac{1}{50}$ and $\frac{1}{30}$ grain.

P1 **Strychninæ Sulphas Acidus** *Syn.* Hulle's Soluble Strychnine. $C_{21}H_{22}N_2O_2.H_2SO_4+2H_2O=468·304$.

Dose.—$\frac{1}{64}$ to $\frac{1}{16}$ grain (**0·001 to 0·004 Gm.**).

In white silky acicular crystals with a slightly acid reaction, soluble 1 in 42 of water.

P1 **Strychninæ Valerianas.**

A non-crystallisable salt supplied in aqueous solution equivalent to 25% of the base. *Dose.*—$\frac{1}{25}$ minim to $\frac{1}{10}$ minim ($=\frac{1}{100}$ to $\frac{1}{40}$ grain of the base). In dispensing, dilution must be carefully made, and part rejected if necessary. A useful nervine tonic, especially for hysterical patients.

Uses of, and References to Strychnine Salts.

In cases of heart disease in which Digitalis is inadmissible, Nux Vomica and Strychnine are used as heart stimulants and for this purpose they are often combined with Caffeine. Patients almost dead from failure of the heart in the course of chronic cardiac disease may apparently be brought round by subcutaneous injection of Strychnine, but some doubt its efficacy.—Hale White.

For old people, Strychnine and Nux Vomica have been described as the only useful bitter tonics.

CARDIOLOGY.—Strychnine has been unduly discredited.—W. Gordon, B.M.J. i./21,13.

PROGRESSIVE MUSCULAR ATROPHY.—To arrest, Strychnine hypodermically the only treatment. Acts more directly than by mouth.—Gowers, Diseases of the Nervous System.

In myasthenia Strychnine hypodermically is frequently beneficial but not curative.—L. i./10,355.

In chorea minor, incontinence of urine, gastralgia, drink craving, Strychnine is useful internally.

PUERPERAL SEPSIS.—In severe cases with failure of circulation often of great value hypodermically.—B.M.J. ii./09,1038.

SEA SICKNESS.—Strychnine Sulphate $\frac{1}{60}$ to $\frac{1}{30}$ grain with Atropine Sulphate $\frac{1}{150}$ grain, either hypodermically or by the mouth in preference (but then less efficient), and repeated in a few hours if necessary. Surface of body should be kept warm.—B.M.J. ii./10,1199.

Gastric Atony.—To produce any beneficial effect very *small* doses of Strychnine must be used.—T. Izod Bennett, B.M.J. i./23,369.

Strychnine as diuretic, *cf.* action of Digitalis, p. 393.

Strychnine used in drug smoking in China.—L. i./26,110.

ⓅSULPHONAL (*B.P.* '14).

$(CH_3)_2.C.(SO_2.C_2H_5)_2=228\cdot256.$

Sulphonmethanum, U.S. X. Fr. Cx., P.G. VI., P. Hung. *Syn.* Dimethyl-Methane-Diethylsulphone.

Manufacturers and wholesale and retail vendors must label Poison and treat otherwise as Ⓟ.

Manufacture.—By oxidation of a compound of ethyl-mercaptan and acetone.—*See* N. Evers. Chemistry of Drugs, 1926.

In colourless crystals or powder, tasteless and odourless, ***soluble*** about 1 in 450 of water. In alcohol 1 in 80, freely in hot alcohol. Melts at 125·5° C.

Dose.—10 to 30 grains (**0·6 to 2 Gm.**). In cachets or suspended with mucilage. P.G. VI. and Fr. Cx. Supp. 1920 have *max. single dose* 1 Gm.; max. during 24 hours 2 Gm. Should be finely powdered and followed by a draught of hot fluid. Unless in solution, a dose should be given an hour before sleep is desired.

Antidotes.—See chapter on.

Uses.—Hypnotic, but is not curative of pain; does not affect digestion, pulse, or temperature, especially desirable for nervous subjects. Useful in chorea. Is slow in action on account of slight solubility; 30 grains may be given in solution in 1 ounce of brandy with 2 ounces of boiling water added (=about 140° F.).

For Calming motor excitement of the Insane.—Fatal accidents seldom occur if given with care and patients watched. If given undissolved it may remain a long time in the alimentary canal. *As far as possible it should be given in solution.* To give 20 grains, ½ pint of a hot beverage at least is needed—milk or whisky. Watch carefully for renal irritation. It should not be given over a long period without a break nor to persons suffering from chronic constipation. Contraindicated in chronic alcoholism.—G. M. Roberston, Jl. Mental Sci., Apl. 1911.

Hæmatoporphyrinuria, followed by increasing weakness, flaccid paralysis and death, after lengthy treatment with Sulphonal (20 grains daily for three months).—Wilfred Harris, L. ii/22,854.

Trismus neonatorum has been cured by enemata of 3 grains supplemented by internal use, but its use is not without risk where considerable physical prostration. Recovery after 365 grains in an adult.—L. i./04 219. Also after 5 to 6 Gm.—L. i./09,811.

Enuresis well treated with small doses.—L. ii./17,728, *cf.* Therap. Index.

Ⓟ **Tablets,** 5 grains (**0·3 Gm.**). *Dose.*—1 to 6. Should be crushed and taken in warm water. Ⓟ**Capsules** contain 5 and 10 grains. Ⓟ**Effervescent Sulphonal** contains 5 grains in 1 drachm.

Ⓟ**Haustus Sulphonal.** Sulphonal 20 grains to 1 ounce of **Mistura Mucilaginosa,** (Mucilage of Gum Acacia 2 drachms, Syrup 30 minims. Water to 1 ounce.) (Was in G.H.)

'**Reversed Sulphonal**,' *i.e.*, Diethyl-methane-dimethyl-sulphone is probably included as Ⓟ by the Order in Council. It is not a homologue of ulphonal but a metameride.—B.M.J. i./13,836.

Ⓟ**Methyl-sulphonal** (*B.P.* '14). *Syn.* ✱**Trional** (T.M. 273851 and 279228)—Fr. Cx. Diethyl-sulfone-methyl-ethyl-methane. **Ph. Ned. VI., P. Belg., P. Helv., P. Jap., P.G. VI., Sulphonethyl-methanum, U.S. X.**

T.M. No. 279228 is the signature of a firm. Patent 16333/1888 expired.

N.B.—Conditions of Sale as for Sulphonal q.v.

$CH_3.C_2H_5.C.(SO_2.C_2H_5)_2=242{\cdot}272$.

Dose.—10 to 20 grains (**0·6 to 1·2 Gm.**), in cachets, in a large cup of hot liquid. Fr. Cx. Supp. 1920 gives latter approx. as max. single, and during 24 hours. P.G. VI. has max. during 24 hours 30 grains.

An oxidation product of mercaptol made by the condensation of methylethylketone with ethylmercaptan. In minute crystals, soluble 1 in 320 of water (we find in practice, 1 in 420), in alcohol 90% about 1 in 11, and in ether. M.pt. 76 to 76·5° C.

Uses.—Has a hypnotic action intermediate between those of sulphonal and tetronal. Has cured chorea. Useful for the insane. Tetronal is the better sedative, Trional is more effective in sleeplessness connected with neurasthenia and organic brain disease. Both are useless in insomnia due to pain, and in morphine and cocaine habits.

Ⓟ**Tablets**, 5 grains (**0·3 Gm.**). *Dose.*—1 to 6.

Recovery after effects of 125 grains.—L. i./03,1096. Poisonings by Trional successfully treated by injections of Strychnine, Smelling Salts, and 1 drachm doses of Sulphate of Magnesium every four hours.—L. i./10,104.

Ⓟ**Haustus Trional,** 30 grains to Mucilage Mixture 1 ounce. (Was in G.H., *cf.* Haustus Sulphonal).

Applying Hans Meyer's Theory *q.v.*, Therapeutic Index—Insomnia, to these methane derivatives of the Sulphones, the coefficient of Trional is 4·46, Tetronal 4·04, Sulphonal only 1·59, which is in practice about their activity. *Trional best of the three, Sulphonal should be dropped, Tetronal too dangerous.*—B.M.J. i./09,554.

SULPHUR.

S=32·064.

Production of Flowers of Sulphur and Roll Sulphur at Rotherhithe. 'Ground' Sulphur is made by grinding Sulphur as imported. The latter is not B.P.—Prof. H. G. Greenish, P.J., i./26,541.

Dose.—20 to 60 grains (**1·2 to 4 Gm.**) in milk or treacle, with confection of senna, or as Pulvis Glycyrrhizæ Compositus. Sublimed sulphur in fine powder, for use either internally or externally, is preferred to Precipitated.

Uses.—*Internally* it has no action on the stomach but a certain proportion administered is converted into alkali sulphides in the intestines with consequent mild laxative effect. Given internally it has been employed for skin affections : occasionally benefiting chronic eczema with much itching. Hale White says its powers in bronchitis and rheumatic affections are doubtful. *Externally* sulphur is commonly used to cure scabies and for acne.

Sweating of the feet has been treated by drachm doses thrice daily.

In diphtheria Sulphur as an insufflation caused death in a child of 9. The practice (dangerous), it appears, is common in South Wales.—L. ii./16,29.

As an antiseptic, Sulphur suspended in glycerin has been injected into suppurating sinuses.

Sulphur Lotum, U.S., is washed with ammoniated water.

'Colloid' Sulphur prepared by precipitating sulphur from polysulphides with an acid in the presence of albumin, is said to be a better antiseptic than ordinary precipitated sulphur.—*cf.* pp. 366 and 377.

SKIN AFFECTIONS.—The skin has been painted with a solution of Sulphurated Potash 1 in 2, twice. The part is then subjected to Acetic Acid Vapour or dabbed with 5 to 10% Acetic Acid. Sulphur is adherent as a thick coating. —B.M J.E. i./13,96.

SEBORRHŒIC ALOPECIA treated by saturated solution of Sulphur in Carbon Disulphide.—Sabouraud, B.M.J. ii./25,984.

RINGWORM OF THE GROIN (singularly intractable) treated by means of Nascent Sulphur, formed by applying a 6% Hyposulphite of Sodium Solution on lint covered with oil silk for about 10 minutes, followed by painting with 3% Tartaric Acid Solution.—J. M. H. MacLeod, Pr., Dec., '12,827.

RICKETS can be prevented by Sulphur, but its action is uncertain.—A. Webster and L. Hill, B.M.J., i./25,958.

Chronic rheumatism treated by intramuscular injection. —Sterilised solution of Sulphur in Poppy Seed Oil injected in 6 minim doses deeply into trunk muscles or thigh. Injection repeated after three days and dose rapidly increased in the following injections to 30—45 minims. Total of 10 injections and repeat after 3 months. Alarming reactions—increase of pain, fever, and vomiting, but night pains lost and motility increased. Should not be used in feeble or querulous patients and where pain is not marked unless increased motility is greatly desired. **Sterules** containing **0·001 Gm.** of Sulphur in **1 Cc.** Poppy Seed Oil have been used.

A **Sulphur Paste** (5%) is being tried to supersede.—A. T. Todd, B.M.J., 1/27,1050.

Arthritis deformans well treated with intramuscular injections of Sulphur in Oil, beginning with 0·002 Gm. of Sulphur in a 1% suspension, increased to 0·02 Gm. by the third injection (in 9 days).—Per Jl. A.M.A., ii./25,1678.

Confectio Guaiaci Composita, L.H. **'Chelsea Pensioner.'**

Dose.—1 drachm (**4 Gm.**).

Guaiacum Resin in powder 2, Sublimed Sulphur 4, Mustard 4, Potassium Nitrate 1, Rhubarb Root 1, Treacle to 64.

Acid Potassium Tartrate is added to some formulæ.

St. M.'s H. has Guaiacum Resin 10, Magnesium Carbonate 10, Sublimed Sulphur 15, Treacle 60. This is a more usual formula.

Confectio Sulphuris (*B.P.* '14).

Contains 45% Precipitated Sulphur with 11% Acid Potassium Tartrate. *Dose.*—1 to 2 drachms. (**4 to 8 Gm.**).

Confectio Sennæ et Sulphuris. C.H., U.C.H.

Dose.—1 to 2 drachms (**4 to 8 Gm.**).

Confection of Senna 1, Confection of Sulphur 1.

Pulvis Guaiaci Compositus (**Chelsea Pensioner**).

Dose.—20 to 40 grains (**1·2 to 2·6 Gm.**).

Guaiacum Resin, Precipitated Sulphur, Heavy Magnesium Carbonate, Gum Acacia and Potassium Bicarbonate, equal parts. The Confection (*v.* above) is more used.

Jephson's Powder. *Dose.*—60 grains (**4 Gm.**).

Precipitated Sulphur 2, Guaiacum Resin 1. For tonsillitis, acne, and constipation.

Tablets of Precipitated Sulphur 5 grains with Potassium Acid Tartrate 1 grain are prepared.

'Stearettes' of Sulphur 5 grains each are prepared.

In the alimentary canal the action of Sulphur only takes place at a point where its contents have ceased to have an acid reaction, and the formation of H_2S and Sulphides will be hastened by an increase in alkalinity. 'Stearettes' of Sulphur are hence suggested in the treatment of acne, furunculosis, urticaria, etc.

Trochisci Sulphuris (*B.P.* '14). *Dose.*—1 to 6.

Contain approx. precipitated Sulphur 5 grains and Acid Potassium Tartrate 1 grain. For skin and rheumatic affections.

Garrod's formula is 4 grains of the Sulphur with 1 grain of Potassium Acid Tartrate in each. See also **Pastilli.**

Unguentum Sulphuris (*B.P.* '14). 1 to 9 Benzoated Lard.

Scabies is treated by Sulphur Ointment after washing with soft soap. Use equal parts of the B.P. Ointment and Vaseline.

Unguentum Sulphuris et Zinci cum Kaolino. Sulphur 4, Zinc Oxide 3, Kaolin 1, Benzoated Lard 8. For sweating of the feet.

Ⓟ**Unguentum Sulphuris cum Hydrargyro,** U.C.H.

Sublimed Sulphur 30, Sublimed Mercuric Sulphide 2, Ammoniated Mercury 2, Arachis Oil 12, Lard 54. Useful in skin diseases.

Unguentum Sulphuris Camphoratum E.L.

Precipitated Sulphur 10, Phenol 15, Camphor 15, Solution of Coal Tar 15, Vaselin 220, Benzoated Lard to 440.

Unguentum Wilkinson. *Syn.* WILKINSON'S OINTMENT. **P. JAP. IV.**

Triturate together Sublimed Sulphur 1, Tar 1, Potash Soap 2, Benzoated Lard 2, Purified Talc 0·5. (TAR, P. JAP. is from several species of *Pinus*).

Unguentum Sulphuris Hypochloritis.

Sublimed Sulphur 12, Essential Oil of Almonds 2, Prepared Lard 84; mix, and add with quick manipulation Sulphur Chloride 2 (a Reddish Liquid $S_2Cl_2=135{\cdot}042$).

Keep in a stoppered bottle; is sometimes made double this strength. Useful in acne, psoriasis and scabies.

Unguentum Sulphuris Iodidi (B.P. 1898). Contains Sulphur Iodide 4 ($S_2I_2=317{\cdot}992$), Glycerin 4; mix in a warmed mortar, and add Benzoated Lard 92. For tinea.

Unguentum Sulphuris et Naphthol Salicylatum.

Tinea circinata can be rapidly cured by an ointment of Sulphur ½ drachm, Salicylic Acid 10 grains, Naphthol 3 grains, Yellow Soft Paraffin 1 ounce.

Sulphuretted Hydrogen Solution.

Is prepared by saturating Distilled Water with Hydrogen Sulphide (H_2S). To preserve, add a little Carbon Di-sulphide.

Lotio Sulphuris cum Sapone.

Precipitated Sulphur 30, Eau de Cologne 60, Glycerin 4, Soft Soap ½, Rose Water to 500. Is recommended for acne of the face.—W. W. W.

Lotio Sulphuris, C.X.

Precipitated Sulphur 20 grains, Glycerin 10 minims, Methylated Spirit 15 minims, Lime Water 2 drachms, Water to 1 ounce.

Lotio Sulphuris Composita, C.X.

Precipitated Sulphur 15 grains, Zinc Sulphate 15 grains, Sulphurated Potash 15 grains, Water to 1 ounce.

Sulphaqua Charges are for dissolving in water to produce sulphur baths for use in skin diseases, gout and rheumatism.

Balneum Sulphuratum. St. Th. H. Sulphurated Potash $\frac{1}{8}$ to $\frac{1}{4}$ ounce per gallon. **St. M.'s H.** is 10 ounces to 30 gallons.

Pomatum Antipsoricum, F.E. *Syn.* **Helmerich's Pomatum.** Sublimed Sulphur 10, Distilled Water 5, Almond Oil 5, Potassium Carbonate 5, Lard 35. All by weight. Is used for scabies.

Fr. Cx. has poppy seed oil *vice* almond oil.

'Danish' Ointment for Scabies.

Dissolve 1 kg. Sublimated Sulphur at gentle heat in 2 kg. 50% Caustic Potash Solution. Mix without heating 225 Gm. each of Vaseline and Anhydrous Lanoline, and add 375 Gm. of the Sulphur solution. Prepare fresh Zinc Hydroxide by mixing 28 Gm. Zinc Sulphate and 40 Gm. 20% Sodium Hydroxide, and add to the ointment; add Liquid Paraffin to 1000 Gm; and Benzaldehyde 5 Gm. to check unpleasant odour produced when the ointment is placed on the skin. Efficacy due to the polysulphides. The ointment is soft, of dark brown colour, and not unpleasant odour.

After cleansing, rub the ointment lightly all over the body, covering all skin; wait 15 minutes and then go to bed. Take second bath at same time next day, and wear fresh underclothing, and cure is finished. Clothes are disinfected.—Svend Lomholt, L. ii./20,1251; *see also* Jl. A.M.A., ii./25,1748.

***Intramine.** (T.M. 370133). *Syn.* Di-ORTHO-AMINO-THIO-BENZOL $NH_2.C_6H_4S.SC_6H_4.NH_2=248{\cdot}24$.

Dose.—For *intramuscular* use, this preparation is supplied in two solutions to be mixed immediately before use in the proportion of one volume of the No. 1 solution and two volumes of the No. 2 solution. The resulting colloidal emulsion contains one per cent. of Intramine. *Dose.*—1 to 5 Cc. The injection is not painful. Intramuscular use is stated to be the most active.

Manufacture.—By oxidising o-Amino-phenyl-mercaptan with Ferric Chloride. It can also be made by heating aniline and sulphur.

The compound is in pale yellow crystals, *soluble* in ether, alcohol and Acetone; insoluble in water.

Uses.—In syphilis give 2·5 Cc. intramuscularly in all cases after the fourth or fifth intravenous dose of Arsenobenzol either once or twice. In late cases one or two injections should precede any treatment with metals. If the case of metallic poisoning is urgent 100 to 300 Cc. of Colloidal Iodine should be given intravenously and 2·5 Cc. of Intramine intramuscularly into each buttock. Repeat in 5 days if necessary.—J. E. R. McDonagh, Pr., Jan. 1920.

In chronic mercury or lead poisoning, weekly intramuscular injections of 2·5 Cc. are advocated.

Chronic bacterial diseases, gonococcal urethritis, and acute gonorrhœal rheumatism are well treated. Non-pustular form of acne vulgaris, acne rosacea, seborrhœic eczema and rheumatic skin affections are well influenced. In ulcus molle serpiginosum its action is almost specific.

Intramine permits of more mercury being given. As much as 10 grains of mercurial pill taken daily with impunity.—G. W. Rundle, L. i./20,1268.

Toxic jaundice occurring in the early stages of syphilis, well treated. Exfoliative dermatitis following even two doses of N.A.B. also well treated.—E. G. Ffrench, L. i./20,1262,1263. *See also* R. Hearn, B.M.J. ii./22,37.

Diortho-amino-thiobenzol is practically a specific for metallic poisoning while the acetyl derivative is as inert as plain colloidal or sublimed sulphur.—C. A. Hill, Pres. Add. B.P. Conf., 1920.

***Contramine** (T.M. 422175). *Syn.* DIETHYL-AMMONIUM DI-ETHYL-DITHIOCARBAMATE. $SNH_2(C_2H_5)_2CSN(C_2H_5)_2=222{\cdot}32$.

Dose.—Intramuscularly 4 grains (**0·25 Gm.**) to 8 grains (**0·5 Gm.**) in 1·5 or

3 Cc. of cold sterilised water or saline. *Must not be heated. Intravenously*, 0·25 Gm. in 10 Cc. of Saline containing 1 Gm. of glucose.

Occurs as white crystals, soluble 1 in 2½ of water.

Manufacture.—An addition product of Carbon Bisulphide and Diethylamine. This is a general reaction for primary and secondary aliphatic amines.

Uses.—It is used to prevent and ameliorate metallic poisoning of various kinds.

In syphilis, rheumatism, arthritis, fibrositis, gonococcal urethritis, skin affections and chronic ulcers. It is employed in conjunction with **Thio-Histamine**—1 Cc. ampoules of the latter contain 0·001 to 0·003 Gm.

Salvarsan-Jaundice, causation and treatment with aid of Contramine.—F. Chamberlain, L.i. /22,733.

Selenium. Se=79·2.

This element was originally discovered by Berzelius in the Lead Chamber-deposits in the manufacture of Sulphuric Acid. It occurs in various Blendes and minerals,—with Lead, Copper, Silver, Iron, etc.—at least three allotropic varieties are known. The chief source of Selenium is Iron Pyrites in which a part of the Sulphur is replaced by Selenium. Traces of Selenium occur in Bismuth preparations.

Selenium and Tellurium belong to the Sulphur group. Selenates and Tellurates are highly poisonous.—unlike Sulphates.

Colloidal Selenium, see **Colloidal Metals**.

Selenium Oxide. *Dose.*—1/64 grain (**0·001 Gm.**) internally 3 to 4 times daily increasing the dose gradually.

CANCER has been treated with this, on the assumption that it conveys Oxygen to the Sulphur in the organism, thereby increasing secretion of Sulphuric Acid in the urine. It has been observed that Sulphuric Acid excretion is lessened in cancer patients.

Selenium preparations do not easily lose their effectiveness as oxidising agents. In the body they constantly move between the higher and lower degrees of oxidation, and their oxidising power is thereby constantly regenerated. *For use in cancer. See* p. 375.

Conductivity of Electricity by metallic Selenium is increased by light. This is made use of in the **Optophone** invented by Dr. F. d'Albe which enables the blind to read print.—B.M.J. i./21,574.

For Organic Selenium Compounds see Vol. II.

SUPPOSITORIA.

Suppositories containing various Medicaments weigh, when prepared with Cacao Butter, 15 grains and upwards. They are preferred with both ends conical shaped so as to pass more easily and be retained by the sphincter muscle.

Suppository Mass for Use in and Export to Hot Climates, (a) Gelatin Basis.

As pointed out under Ovule Masses, it is almost impossible to make a basis that shall stand temperatures above 100° F. and yet melt at body temperature. The best one can do is to fortify with Gelatin so that the melting point is *not much above* 98° *to* 99° *F.*

Bougie Mass (*q.v.*) carries out these conditions when there is a sufficiency of adherent moisture on the part.

(b.) Theobroma Basis.—

The *B.P.* '14 statement on the subject is, "More or less Beeswax may be used in place of Theobroma according to prevailing temperatures," 5 to 10% is commonly employed. We consider 15% is best, but it must be remembered that different samples of Theobroma Oil and White Wax each have somewhat different melting points. Certain Melting Points we find are yielded by mixtures in proportions stated under "Ovule Masses for Hot Climates." The remarks there given apply equally to Suppositories with Theobroma Oil basis.

✱**Sempules** (T.M. 329438) for the treatment of hæmorrhoids are suppositories with a wide core, coated with a Medicated Theobroma basis. The suppository has a bulb at each end. which it is claimed keeps the stem in the anal canal. They are medicated with the usual medicamenta and are supplied in gelatin with two Melting Points 80·6 F. and 89·6 F., also with Theobroma basis.

Tampons. For vaginal and uterine medication the following are made. The pledgets are globular in shape, about 1½ in. in diameter, composed of **wool, gauze covered.**

Glycerin Tampons. Saturated with glycerin. **Argyrol Tampons,** containing 1, 5 and 10% Argyrol in Glycerin. **Ichthyol Tampons** saturated with 5, 10 or 20% Ichthyol in Glycerin. **Iodoform Tampons,** S H., with 5% Iodoform in Glycerin.

TABLETTÆ.

(Compressed Tablets).

In the preparation of Tablets the material has first to be *granulated*, to make it flow easily from the 'hopper' and to prevent it sticking between the dies and punches of the machine; this is effected by moistening with a little alcohol or water (to which, if desired, a minute quantity of mucilage diluted about 1 to 4, may be added), rubbing through a suitable sieve (No. 16), and drying *thoroughly* either by very slight heat, or better, by exposure to the air if sufficiently dry at the time. The decomposition, melting points or volatility of the chemicals to be compressed must be borne in mind, Salol, Beta-Naphthol, Benzoic Acid, Sulphonal, Trional and Phenacetin should not be heated. To obviate the sticking referred to, lubrication with Boric Acid (2%), or spraying with a solution of Soft Paraffin or Cacao Butter in 1 in 6 each Ether and Alcohol, or less of the latter are resorted to in some instances.

Substances already in small crystals, *e.g.* Potassium Chlorate and Ammonium Chloride, do not require this treatment. Tablets *to dissolve like lozenges* require half their weight of a mixture of equal parts of Acacia and Tragacanth. Owing to ***Incompatibility,*** Sodium Bicarbonate and Calomel, Saccharin and Rhubarb, Salol and Camphor, Salol and Thymol, Caffeine Citrate with Acetanilide and Antipyrin, Salicylic Acid and Iron Compounds, Chloral and Alkalis, Mercuric Chloride and Metals, oxidising agents, *e.g.* Potassium Chlorate and Permanganate, with Charcoal, Sulphur, Iodine or Sugar, should not be compressed together.

Five or ten per cent. of (potato) starch thoroughly dried is useful to ensure rapid breaking up of the Tablet. Deliquescent compounds should be treated with Gum Acacia or Tragacanth.

Similarly, if the powder is of a very dusty nature the judicious use of a little of these gums or of glucose is an advantage. Fibrous drugs may have 5% Dextrin. Many substances if compressed too hard are liable to cause the tablet to crack—this is particularly the case with Phenacetin and Antipyrin—the least possible amount of pressure should be applied that will produce a permanent tablet.

'Capping' *i.e.*, splitting off of the surface of the tablet is due to too much pressure, or, it may be, a worn-out punch, or to moisture or too much lubricating powder.—Disp.

The majority of 5-grain Tablets are made to weigh 6¼ grains with Milk Sugar.

Acetanilide. 1 grain in 1⅗ grains. Add 5% Potato Starch.

Acid Aceto-Salicylic (*Syn. Aspirin*). A little lubricant may be necessary.

Aloin as Arsenious Acid, *q.v.*

Alum. Dry thoroughly to remove water of crystallisation.

P1 *Arsenious Acid.* Sugar of Milk, with a small amount of lubricant.

Balsams. Mix with 25% Magnesia and evaporate to dryness.

Bismuth Carbonate and Sub-nitrate. Make 5 up to 6¼ with Cane Sugar (some use Lactose), adding a small percentage of lubricant.

Bismuth Salicylate, as Salicin.

Bismuth and Soda. Bismuth Carbonate 3, Sodium Bicarbonate 2, Lubricant *q.s*

Caffeine, as Arsenious Acid.

Calcium Lactate.—Use small pieces or crystals in preference to the powder.

Calomel. Sugar of Milk as diluent.

Cascara. Compress the Extract properly granulated.

Charcoal to have 25% Cane Sugar or Acacia, or Gelatin Solution with a small amount of lubricant.

Ⓟ *Codeine*, as Arsenious Acid.

P1 *Digitalin* and *Digitoxin* as Arsenious Acid.

P1 *Dover's Powder.* 2½ grains in 3 grain tablet.

Effervescent Materials may be granulated separately and mixed dry.

Ginger may have 5% Dextrin.

Gregory's Powder. Make 5 up to 6¼ with Cane Sugar, moistening with Water.

Grey Powder. Needs sugar and Strong Mucilage.

Guaiacol. Make up with Sugar, adding Water and Lubricant *q.s.*

Ⓟ *Ipecacuanha* Make up with Sugar and Water. Some employ 5% Dextrin.

Ⓟ *Mercuric Biniodide* (for administration *per os*) as Arsenious Acid.

D P1 *Morphine*, as Arsenious Acid.

P1 *Nux Vomica Extract*, as Arsenious Acid.

Oily substances require 2 to 5% Calcined Magnesia.

D P1 *Opium.* Mix with Sugar or Sugar of Milk, using a little lubricant.

Pancreatin. 5 grains in 6¼ grain tablet.

Pepsin. Mix with Sugar, granulate with 60% Alcohol, and use lubricant *q.s.*, 5 grains in 6¼ grain tablet.

Phenacetin. Make 5 grains up to 6¼ grains with Sugar, 5% Potato Starch. and a little Glucose useful. Lubricant, *q.s.*

Phenazone. Make 5 up to 6¼ with Sugar.

Podophyllin. as Arsenious Acid.

Quinine—use Starch and lubricant *q.s.* 2 grains in 2¼ grain tablet.

Saccharin prepared with Sodium Bicarbonate, *q.s.*

Salicin. Mix with Sugar, and use lubricant *q.s.*

Salol requires 10% Potato Starch, with Sugar. 5 grs. made up to 6¼.

Soda Mint. Sodium Bicarbonate, Peppermint Oil, Acacia, *q.s.*

Sodium Citrate. Use proportional amount of the exsiccated salt and compress lightly.

Sodium Salicylate. Make 5 up to 6¼ with Cane Sugar, Lubricant *q.s.*

P1 *Strychnine* as Arsenious Acid.

Ⓟ *Sulphonal* as Salicin.

Thyroid. Made of Desiccated Thyroid Gland with lubricant *q.s.*

Zinc Sulphate for lotions. Remove water of crystallisation.

Stearettes, *i.e.*, Tablets coated so as to be more likely to dissolve in the intestines than in the stomach, *vide* p. 697

Tablet Triturates are made in metal or vulcanite moulds which are worked by hand, yielding 50 to 200 at a time, the weights ranging from $\frac{1}{2}$ grain (0·03 Gm.) to 1 grain (0·06 Gm.) and the diameters between $\frac{1}{8}$ and $\frac{9}{32}$ inch, and $\frac{1}{8}$ inch in depth. The active ingredient is mixed with Lactose or Sugar, the whole being massed together with a little alcohol or alcohol and water.

For Hypodermic Tablets, Sterilised Milk Sugar, or Cane Sugar is a useful diluent. These are prepared under aseptic precautions. A little Boric Acid is useful as lubricant. Dried Neutral Sodium Sulphate, Sodium Chloride and Ammonium Chloride are also employed in some instances Hypodermic Tablets are well made in a Tablet Triturate mould with holes $\frac{5}{32}$ in. in diameter, the plate being $\frac{1}{10}$—$\frac{1}{8}$ inch in depth.

Notes on Manufacture of Tablets.—P.J. ii./08,276; ii./11,432.

For List of Tablets in general demand *see* Index.

TEREBENUM.

Dose.—5 to 15 minims (0·3 to 1 Cc.).

A colourless liquid consisting of dipentene and other hydrocarbons, produced by the action of sulphuric acid on oil of turpentine and distillation. Sp. Gr. 0·862 to 0·866—*B.P.* '14. It has an agreeable odour resembling fresh-sawn pine-wood. Boils at 160 to 172° C. U.S.

Modifications of Pharmacopœial Standards. The O.R. Test is useless. Owing to change in character of Turpentine the specific gravity of Terebene is invariably lighter. It should distil mainly between 165 and 185° C., not more than 5% below 160° C.—B. F. Howard, B.P. Conf., 1919.

Soluble about 1 in 4 alcohol 90% by our experiment. The substance is indefinite, and a sample we examined is as clear 1 in 4 as 1 in 5; soluble in all proportions in absolute alcohol or chloroform. It is not miscible with water, but may be emulsified by mixing it with one sixth its weight of tragacanth powder, then adding water and shaking.

Uses.—An agreeable antiseptic, disinfectant, and deodoriser. The vapour is a useful sedative and antiseptic inhalation in phthisis, *e.g.*, in a respirator, and, administered at the same time in 5-minim **Capsules** or **Pastils.** It may also be inhaled for cough, *e.g.* whooping cough and in hay fever. Useful also in dysentery *per os.*

In excess it may produce albuminuria and hæmaturia.

PRURITUS. Recurrent cases often accounted for by mental worry. Terebene on sugar is a good intestinal disinfectant and stimulant, also useful in urticaria in children, *e.g.*, in a mixture with Magnesium Carbonate.—L. ii./12, 968.

Haustus Terebeni.—Vic. Park.

Terebene 10 minims, Mucilage of Tragacanth 1 drachm, Glycerin 1 drachm, Cinnamon Water to 1 ounce.

Vapor Terebeni, T.H.

Terebene 40 minims, Light Magnesium Carbonate 20 grains, Distilled Water to 1 ounce. A teaspoonful in a pint of water at 140° F. for inhalation. For medicating antiseptic respirators, 10 drops of a mixture of equal parts, Terebene, Phenol, and Spirit of Chloroform, is often used.

Terpinum Hydratum, U.S. X. Fr. Cx., P. Hung. Ph. Ned. V.—*Syn.* Terpine. $C_6H_8(OH)_2.CH_3.C_3H_7+H_2O=190\cdot176$.

Dose.—2 to 6 grains (**0·12 to 0·4 Gm.**) or more, in cachets, slipules, or pills, or suspended.

Prepared by acting during cold weather upon Rectified Oil of Turpentine 4, Alcohol 80% 3, with Nitric Acid 1 in flat dishes. Crystals separate after several days, and are recrystallised from 95% Alcohol rendered slightly alkaline. Yield 12% of the oil taken.—Caspari.

Sir W. A. Tilden, F.R.S., Prof. W. H. Perken, F.R.S., and J. C. Umney on Terpenes—advance course lectures.—P.J. i./12,581, 651, 723, 756, 817 See also P.R., July, 1912, Synthesis of the Terpenes—*ibid.*

A derivative of oil of turpentine in prismatic crystals, soluble in water about 1 in 250, 1 in 44 of alcohol 90%, and about 1 in 6 in oils.

Flavoring.—Prescribed as **Linctus Pini Terpin et Heroin** *q.v.*

Uses.—Lessens cough; has been used with success in bronchitis, chronic and subacute; it assists expectoration, *e.g.*, in initial catarrh of phthisis; useful as a hæmostatic in bleeding from lungs. Diuretic.

Terpinol. *Dose.*—1½ minims (**0·1 Cc.**) or more in pill, or gelatin capsule. An agreeably aromatic liquid, containing bodies of the composition $C_{10}H_{16}=136\cdot128$ and $C_{10}H_{18}=138\cdot144$. Is obtained by the action of dilute sulphuric acid on terpene. Miscible with alcohol in all proportions, but insoluble in water It is used for lung affections; if it disorders the stomach it should be given with meals. In pulmonary hæmorrhage in 3 drop doses used with advantage.—J. W. Allan, Glas. Med. Jl., Nov., 1913.

Methylene Blue dissolves in boiling Terpinol producing a colourless solution; the colour, however, precipitates again on cooling.—W. T. Robinson.

Terpineol. *Syn.* Terpilenol. $C_{10}H_{17}OH=154\cdot144$. A product of fractional distillation of Terpinol Sp. Gr. 0·940 used for disguising odour of Iodoform and for scent making (in the name of Artificial Lilac). *Syn.* **Cinyl Alcohol,** described—Allen, 1911, Vol. IV., p. 280.

THEOBROMA.

The seeds of Cacao, *Theobroma Cacao* (*Sterculiaceæ*). When heated and deprived of husk and membrane, these yield **Cocoa nibs.** The nibs ground, and most of the oil pressed out, produce, when reduced to powder, the best forms of **Cocoa** for use as a beverage.

For further details on Cocoa, see Vol. II.

Oleum Theobromatis. *Syn.* Cacao Butter.

The concrete oil of the seeds (yield about 45%). Melting at about 86 to 91·4 F. (30 to 33° C.), *i.e.*, below the temperature of the body, is much used for suppositories. For substances which lower the melting point of the oil, and for export to hot climates, it is well to add 5 to 15% yellow wax. (*Cf.* 'Ovules.')

Note on Cacao butter and substitutes.—P.J. ii./09,158.

To deodorise for cooking, it has been suggested to heat the oil in an open pan to 370° F. for five minutes and cool again, and to give it butter consistence to add to each 4 parts of cacao butter melted, 5 parts of cotton seed oil.

Pasta Theobromatis, Chocolate.

This is made by grinding the nibs into a paste, with sugar and vanilla or other flavouring added; it should contain not more than 50% of sugar and about 25% of fat (*Oleum Theobromatis*), and be free from gum, added starch, or other admixture.

The author uses chocolate for the preparation of medicated **Tabellæ.** On account of its agreeable flavour and the preservative action of its fat and sugar, it forms a useful basis for administering many medicines. The solvent action of its fat renders it eminently useful for fixing **Nitro-glycerin, Erythrol Nitrate, Mannitol Nitrate, Menthol,** and alkaloids. For full list *vide* Index—Tabellæ.

Theobromina. Ph. Ned. V.

$C_5H_2(CH_3)_2N_4O_2$=180·096. (*See also* p. 249). *Syn.* DIMETHYL-XANTHINE, SANTHEOSE.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

Alkaloid, about 1 to 2% from the seeds, in white crystalline powder, *sparingly soluble* in water, alcohol and ether. Caffeine is trimethylxanthine. 2% solutions may be obtained with aid of Tri-Sodium Phosphate.

Uses.—As a diuretic, relieves cardiac and renal dropsy (but some think it bad therapy to put extra work on diseased kidneys), and in angina pectoris, 20 to 30 grain doses spread over 24 hours lessen the frequency and severity of attacks. Given in cachet and pill.

A tendency to cardiac failure in pneumonia is often well treated by strong coffee. It has a tonic effect on the heart.—Burney Yeo.

Theobromine-Sodium-Sodio Acetate. *Syn.* **Theo-Sod-Acet.** ∗AGURIN (T.M. 235517, 322517). $C_7H_7N_4O_2Na+NaC_2H_3O_2$ =284·506.

Dose.—10 to 15 grains (**0·6 to 1·0 Gm.**), up to 45 grains daily in fresh solution. 'Slipule' No. 00 holds 10 grains.

White crystalline hygroscopic powder soluble 1 in 2 of water and about 1 in 200 of alcohol 90%. In dropsy, sciatica and neurasthenia. Is strongly diuretic in action. Not to be given with acid substances, nor with sugar or gum, and in general *incompatible* as for Theo-Sodo-Sal *q.v.* To be preserved from the air, the CO_2 of which tends to decompose it. Relieves cardiac dropsy.

Theobromine-Sodio Sodium Formate. *Syn.* **'Theo-Sodo-Form'** $C_7H_7N_4O_2Na.HCOONa.H_2O$=288·106. *Dose.*—8 to 15 grains (**0·5 to 1·0** Gm.).

A white powder soluble in water; analogous in action with 'THEO-SODO-SAL'; *incompatible* as the latter. Diminishes coagulability of the blood. **Tablets** 8 grains.

Theobrominæ Aceto-Salicylas. $C_7H_8N_4O_2C_9H_8O_4$ = 360·16. *Dose.*—1 to 5 grains (**0·06 to 0·3 Gm.**).

White crystalline powder soluble in alcohol. Has some advantages due to containing the Aceto-Salicylic grouping.

Theobrominæ et Sodii Salicylas (*B.P.* '14).—*Syn.* **'Theo-Sodo-Sal, ∗Diuretin** (T.M. 223214). P. AUSTR., F.E., PH NED. V. $C_7H_7NaN_4O_2+C_6H_4(OH)COONa$=362·122. *Dose.*—10 to 20 grains. (**0·6 to 1·2 Gm.**). Max. dose *pro die* 90 grains. Slipule No. 00 holds 10 grains.

Manufacture.—Rub Theobromine 18 to a paste with water 10 Dissolve Sodium Hydroxide 4 or *q.s.* in water 8 and add to the Theobromine until clear. Add Sodium Salicylate 16, filter and evaporate on a water bath or *in vacuo.*

A sodio-salicylic compound containing about 50% of sodium-theobromine in white powder, soluble 1 in 1 in water (a little Sodium

Salicylate added will often 'clear' a strong solution). This solubility we find refers to the freshly made compound.

It is rapidly decomposed in moist air with absorption of CO_2 and liberation of Theobromine—hence less soluble in water. It must be kept in *stoppered* bottles. B.P. requires 40% Theobromine, U.S.P. 46·5%. Theory for $Na_2C_{14}H_{12}N_4O_5$ is 44·19% Sodium Salicylate and 55·81% Sodium Theobromine. C. T. Bennett and F. B. Windle recommend new method for analysis.—P.J. i./21,472.

Incompatibles: Theobromine Sodium Salicylate and Theophylline Sodium Acetate are incompatible with Ammonium Salts, Sodium Bicarbonate and all acid salts, alkaloidal salts, free inorganic and organic acids, and Aromatic Spirit of Ammonia.—J. W. Plenderleith, P.J. i./23,364.

Flavoring—Glyl Lavandulæ, Syl Vanillæ; Syrupus Zingiberis, Extractum Glycyrrhizæ Liquidum.

Uses.—Diuretic (*cf.* Theobromine), without affecting nervous system and causing sleeplessness. Safe for scarlatinal dropsy of children. In angina pectoris it lessens the frequency of attacks. Given for cough.

Tablets contain 5 grains.

The action of this body upon the renal secreting cells has been disputed—some say its diuretic effect is due to its power of causing dilatation of the renal vessels. It is said also to promote the elimination through the kidneys of common salt. Should be given in small dose—3 to 6 grains.—B.M.J. i./11,290.

Lithium-Diuretin. *Syn.* UROPHERIN.

$C_7H_7LiN_4O_2 + C_6H_4(OH)COOLi = 330·008$. *Dose.*—5 to 15 grains (**0·3 to 1 Gm.**).

A white powder soluble 1 in 5 of water. A similar diuretic.

Theobromine Calcium Salicylate. *Syn.* ✱ CALCIUM-DIURETIN, THEOCALCINE. $Ca(C_7H_7N_4O_2)_2 + Ca(C_6H_4OH.COO)_2 = 712·396$.

Dose.—7 to 15 grains (**0·5 to 1 Gm.**).

Manufacture.–Prepared similarly to the Sodium salt from Theobromine, Calcium Oxide, and Calcium Salicylate.

A white powder slightly soluble in water, containing about 48% Theobromine and 11% Calcium.

Uses.—Similar to Theobromine Sodium Salicylate.

For arteriosclerosis (30 grains daily).

ASTHMA.—Calcium Diuretin taken once or twice in the evening stated to be an almost certain preventive.—B.M.J.E,. i. /26,16.

Iodo-theobromine. (*Syn.* **Theobromine Sodium-Iodo-Salicylate**).

Dose.—2 to 10 grains (**0·12 to 0·6 Gm.**).

White powder, containing about 40% theobromine with 22% sodium iodide and 38% sodium salicylate, soluble in water, is a good diuretic and heart stimulant, increasing blood pressure. In cirrhosis of the liver and acute nephritis.

Theobromine-Sodio Sodium Iodide. *Syn.* EUSTENIN.

$C_7H_7N_4O_2.Na.NaI = 352·014$.

Dose.—8 to 15 grains (**0·5 to 1 Gm.**).

Has been given in arteriosclerosis, angina and aortic aneurism.

Compound Theobromine Tablets.

Dose.—Up to six during the day, increased if necessary. To be continued for 10 days and then stopped.

Theobromine 3 grains (0·2 Gm.)· Potassium Iodide 1½ grains (0·1 Gm.), Potassium Nitrate 3 grains (0·2 Gm.), and Sodium Nitrite 1/12 grain (0·005 Gm.)

A preparation on these lines is used abroad in treatment of arteriosclerosis, angina pectoris, and excessive use of tobacco.

Theophylline, U.S. X. DIMETHYL-XANTHINE. (Isomeric with Theobromine).

Syn. ✱THEOCIN. (T.M. 247465/1900 *removed* but 322570 is on the Register) $C_5H_2(CH_3)_2N_4O_2$=180·096. (*See also* p. 249.)

Dose.—3 to 6 grains (**0·2 to 0·4 Gm.**).

White crystalline powder, soluble 1 in 200 (by experiment) of cold water and about 1 in 90 of Alcohol (90%). M.Pt. 269—272° C. Marked diuretic.

Has been found useful in heart affections attended with symptoms of congestion, and nephritis with dropsy. **Tablets** weigh 4 grains.

Theophylline-Sodio Sodium Acetate (contracted to 'THEOPHYLLINE SODIUM ACETATE').

$C_5H_2(CH_3)_2N_4O_2Na.NaCH_3COO$=284·226.

Dose.—2 to 4 grains (**0·12 to 0·25 Gm.**) dissolved in water, three or four times daily after meals.

Flavoring.—Glyl Menthæ Piperitæ, Syl Vanillæ.

Nausea may be prevented by small doses of Menthol beforehand, *e.g.* $\frac{1}{10}$ grain in 15 minims of Tincture of Orange.

The compound is made on the lines of the analogous Theobromine Compounds (*vide antea*).

White flocculent powder—*Soluble* about 1 in 20. For œdema and dropsy of cardiac origin. For excitable neuropathic individuals. Paraldehyde may be given simultaneously.

Theophylline Sodium Acetate Tablets—4 grains are prepared.

In epidemic nephritis among soldiers this drug appeared to act as a renal rritant as well as diuretic and unsuitable in acute cases. The same true of Diuretin. Hot air baths have definite limitations. Only useful if followed by diuresis. Low nitrogenous diet recommended during the acute stages but one containing variety.—Langdon Brown, L. ii./16,863.

The addition of Theocin to digitalis therapy in dropsy often "tips the balance" and makes the kidneys act. Has proved suitable when both heart and kidneys are diseased. The action is often very striking. Theocin Sodium Acetate may start its action within an hour. If no effect is manifested within 24 hours or after 40 grains it is of little use continuing the drug. Theocin appears to act more effectively after the patient has taken a sufficient amount of digitalis to affect the heart.—G. A. Sutherland, L. i./17,441.

THORIUM.

Th. = 232·15.

Manufacture.—Thorium occurs as Silicate in Thorite and Orangite in Norway. For details of the manufacture of Thorium and Mesothorium from Monazite Sand (content 4% of Oxide), *see* Vol. II.

Gas Mantles contain 99% Thorium Oxide and 1% Cerium Oxide. For history and description of Incandescent Lighting, see C.D. ii./07,315, and E. White, P.J. ii./12,580.

The following Salts and Compounds of the Element, by reason of their radioactivity, relatively slight in comparison with Radium it is true, have found therapeutic utility.

We deal here with the 'ordinary' inorganic and organic compounds; the radio-active bodies and their disintegration products are dealt with in Vol. II.

Thorium Oxide. ThO_2=264·15.

A heavy white powder insoluble in water and dilute acids.

Injectio Thorii Oxidi.

A suspension in Liquid Paraffin has been suggested for diagnostic purposes in "X" ray work, to replace Beck's Bismuth Paste.

Thorium Pads, containing **Thorii Hydroxidum,** $Th(OH)_4$=300·182, have been made to fit the part affected, *e.g.*, head, spine, &c. For use in nerve affections.

Thorii Nitras.—$Th(NO_3)_4$=480·182 (+$4H_2O$=552·246).

White crystals—usually in commerce with water of crystallisation. Apart from its use in the mantle industry is employed for producing Thorium 'X' and the Emanation Inhalation (*q.v.* Vol. II).

Soluble in water 1 in less than 1; in Alcohol 1 in 5.

Exsiccated Salt is soluble to the extent of 2½ in 1 of water (by experiment, 1914).

Thorii Chloridum $ThCl_4+8H_2O$=518·106, and **Thorii Sulphas** $Th(SO_4)_2 4H_2O$=496·342.

White crystals—the former soluble in water—the latter slightly so.

TYPHOID and PARATYPHOID and other intestinal affections well treated by Thorium Sulphate at the rate of 4 Gm. *pro die* either in form of 2% solution or in cachets. Effects said to be most marked.—Paris Medical, 1917, 7, 398 (Nov. 10th). See also Pres., Jan. 1918.

Organic Thorium Compounds.

The following organic salts have been prepared and are supplied under the brand ✱"**Thoriac**" (T.M. 274176). The lactate and the sulpho-carbolate are soluble in water; the others being insoluble or only slightly soluble compounds, suggest themselves for external employment in the form of dusting powder, pigment, or ointment.

Uses.—The sulphocarbolate may be found of use in intractable skin diseases. The ointment of the oleate (*q.v.*) has been found of utility in these affections.

Doses.—Some of the compounds have not been extensively used; we are of opinion that 1 to 5 grains can safely be given providing the effects be carefully watched, beginning with the smaller amount —*cf.* the large doses of the sulphate recently given.

Thorii Camphor-Sulphonas.

$Th(C_{10}H_{15}O.SO_3)_4,9H_2O$=1319·03.

The camphor sulphonic acid necessary is prepared by acting upon 152 of camphor (in solution in acetic anhydride) with 98 of sulphuric acid, producing, theoretically, 232 of camphor-sulphonic acid. This quantity requires theoretically, 75 of thorium hydroxide for saturation. Well-defined crystals.

Thorii Cinnamas. $(C_6H_5.CH:CH.COO)_4Th$=820·374.

Thorium cinnamate is made by treating sodium cinnamate with thorium nitrate. It contains about 32% ThO_2. Insoluble in water.

Thorii Ortho-Coumaras. $(C_6H_4OHCH:CH.CO.O)_4Th$=884·374.

Prepared by double decomposition between thorium nitrate and sodium ortho-coumarate. A fine white powder, insoluble in water.

Thorii Aceto-Coumaras, *vide* **Tylmarin-Thorium.**

Thorium Glycerophosphate, Phthalate and Camphorate.

Prepared by double decomposition. White powders.

Thorii Lactas. $Th[CH_3.CH(OH).COO]_4,2H_2O$=624·342.

By interaction of the freshly precipitated hydroxide with lactic acid. It is a crystalline soluble salt, but becomes basic and less soluble on keeping.

Thorii Oleas.

Thorium Hydroxide 300 will interact with approximately 1,120 of oleic acid. A little ether is added to dissolve the oleic acid. The salt is at first pasty, becoming hard ultimately. Suggested for use in the form of an ointment with paraffin basis for eczema.

Unguentum Thorii Oleatis (Drage). Contains 25% Thorium Oleate rubbed into a smooth cream with Almond Oil.

Used with marked success in old chronic psoriasis, eczema rubrum, gouty eczema, and in boils and carbuncles. In our knowledge sycosis was cured with a few applications.

Thorii Quinas.

This is prepared by treating the hydroxide (freshly precipitated) with quinic acid. Scales are easily obtained. *Soluble* in water 1 in 1 easily, slightly in alcohol, 90%.

Thorii Salicylas.—This salt, made by precipitating thorium nitrate with sodium salicylate, is a basic one in form of white, insoluble powder apparently having the formula $(C_6H_4OH.COO)_2$ ThO$=$ 522·23. It contains 50% ThO_2.

Thorii Sulphocarbolas. *Syn.* THORIUM *p*-PHENYL-SULPHONATE. $Th(C_6H_4.SO_3.OH)_4,9H_2O=1086{\cdot}710$.

A well-defined crystalline salt with pinkish shade of colour. Suggested as a radio-active antiseptic. Readily soluble in water and about 1 in 3 in alcohol 90%; but from both the solutions we find that separation shortly occurs owing apparently to dissociation.

Thorium-Sodium Citrate Solution as *Pyelographic Medium*—*see Vol. II.*

The use of **Thorium Sodium Acetate** as a diuretic, to be given by the mouth, has been mentioned in the literature. This is an error. **Theocin Sodium Acetate** is intended.

THYMOL.

$C_6H_3(CH_3)(OH)C_3H_7,1:3:4,=150{\cdot}112$.

Dose.—½ to 2 grains (**0·03 to 0·12 Gm.**), in pills with soap and a trace of Alcohol, or in oily or aqueous solution. Anthelmintic. *Dose* 15 to 30 grains (**1 to 2 Gm.**).

A Phenol obtained from the oils of *Thymus vulgaris*, *Monarda punctata*, (*Labiatæ*) and *Carum copticum*—*Umbelliferæ*. The oil of the last mentioned is *B.P.* '14 as Oleum Ajowan with not less than 40% Thymol.

Ocymum gratissimum Oil as a source of Thymol (39·15%). Widely spread in East Indies, Ceylon, Java, tropical Africa and Central America. Cultivated on the Ivory Coast.—P.R., 1923,14,154, Y.B.P., '23,113.

For further sources and details and for Synthetic Thymol, see Vol. II.

Relative low toxicity of Oil of Thyme.—L. ii./25,1198.

Monarda Punctata Oil contains 60% Thymol as against 45 to 50% in oil of Ajowan from India. *Origanum hirtum* growing in Crete and Dalmatian coast contains 60–67%. *Mosla Japonica* 44%. Wild Thyme of France 20% —P.J. i./15,114. It is produced on a commercial scale from Oil of Ajowan Seed.—D. Hooper, P.J. ii./16,49.

U.S.P.X. places no restrictions on synthetic, *e.g.*, from Cymene or meta-Cresol, or made from Piperitone derived from various species of Eucalyptus.—H. Finnemore, P.J. i./26,32.

Omam.—*Syn.* **Ajowan.** The drug is given in the dose of 10 to 30 grains (0·6 to 2 Gm.) as Extractum Ptychotis Liquidum P.I.

Aqua Ptychotis P.I. (Omam water) made by distillation with the fruit is given in the dose of 1 or 2 ounces (30 to 60 Cc.). The dose of the volatile oil is 1 to 3 minims (0·05 to 0·2 Cc.).—N. S. D.

Thymol is in large transparent crystals melting at 111° F. having the odour of thyme and a burning taste.

Soluble 1 in 1,500 of water, 1 in 200 of glycerin, 1 in 8 of alcohol and glycerin, equal parts; soluble in fats and oils, and 8 in 3 of alcohol 90%, and freely soluble in ether, acetic acid and caustic alkalis. Liquefies Menthol, Chloral Hydrate, Camphor and Phenol.

Uses.—Externally a powerful antiparasitic, also for certain stages of eczema and psoriasis (*see* Unguentum) and for burns (*see* Volckmann's solution). A powerful antiseptic. (Our experiments prove this *cf. Antiseptic Powers, Vol. II.*). It is also a good deodorant. May colour the urine green. The administration simultaneously with or immediately after a large dose of a solvent of thymol, *e.g.*, alcohol, should be avoided. May be inhaled (*see* Vapor).

ANKYLOSTOMIASIS. Thymol 10 to 30 grains (0·6 to 2 Gm.) or more, in fine powder mixed with milk sugar is taken fasting repeated in 2 hours time and *followed by purge* (Sodium Sulphate in preference).

It is sometimes combined with Betanaphthol.

Ankylostomiasis treated by ½ drachm dose of Beta-Naphthol and Thymol ½ drachm in a one ounce draught, repeated.—H. G. Phippen, B.M.J. i./23,371.

Thymol, 3 cachets of 15 grains, given at intervals of 2 hours—routine treatment.—N. Cantlie, Jl. Trop. Med., Feb. 1/23,42.

For mode of infection, details of the parasite and further notes on treatment of ankylostomiasis, vide Carbon Tetrachloride, and Vol. II.

TÆNIA.—One or two doses of 5 grains in the early morning with a tumblerful of water generally causes tapeworm to be passed in a stool in the evening.—George V. Perez, B.M.J. ii./13,49.

GOITRE.—Cases treated by 10 grain doses twice daily. Patient's dietary should contain no solvent of Thymol. Give as coarse powder and wash down with draught of water. In some cases swellings in the neck disappear rapidly. β Naphthol also beneficial. Maj. McCarrison regards the action of Thymol in goitre as very strong, though not conclusive evidence that the habitat in man of the organism responsible for the production of goitre is the intestinal tract. The action is a local one on the gut. The drug acts by destroying the living excitant of goitre or by reducing its activity or numbers so that the production of toxic substances is lessened and the thyroid is relieved of the excessive demand for secretion which necessitated the hypertrophy. —L. i./13,368 and Therap. Index.

TUBERCULOUS ABSCESSES have been treated by injections of Thymol 1, Camphor 2, Ether 3.

For ***skin sterilisation.*** A 5% Alcoholic Solution of Thymol has been used in the place of Iodine Tincture (*q.v.*) prior to the commencement of the operation. Two applications are made with an interval of five minutes, three minutes after second application the operation may be started.

Thymol Disinfectant (*Martindale*).

This preparation was made during our investigation of the antiseptic power of Essential Oils (*q.v.*). It is a potent antiseptic having a Rideal-Walker Carbolic Acid Coefficient of 8. It is employed as a general disinfectant and for instruments and in less strength for use to mucous membranes. For *Medical Purposes* a 0·1% (10 minims to the pint) dilution with water, forming a white emulsion, will have the same bactericidal power as a 1% Solution of Phenol.

A stronger proportion than this (which would contain 1 of actual Thymol in 3,000) cannot well be tolerated by the mucous membrane —hence should be used with caution as it causes a temporary stinging sensation.

For *General Disinfection* 1 in 200 (one tablespoonful to 5 pints).

Liquor Thymol 1 in 800 of warm water.

This saturated aqueous solution is used diluted as an antiseptic gargle, but we agree with J. T. Hall, B.M.J. ii./17,99, that undiluted it is too strong. It "stings like mustard."

As a mouth wash found efficient by cultural experiments.—H. P. Goodrich, B.M.J. i./17,473.

Lotio Potassii Thymatis U.C.H.

Thymol 8, Solution of Potash 120, Glycerin 16, Water to 1,000.

Mistura-Oleo-Balsamica.—*Syn.* BALSAMUM VITÆ HOFFMANNI. 'Tincture of Life.' *Dose.*—1 to 4 drachms in water.

Oils of Lavender, Thyme, Lemon, Nutmeg and Orange Flowers of each 4 ; Oil of Cloves and Cinnamon 3½ of each ; Balsam of Peru 10½ ; Alcohol 90% to 1,000 ; allow to stand a few days, then filter.

Is used in Africa as a remedy for snake bites. A carminative stimulant.

Ophthalmic Discs of Thymol contain $\frac{1}{1000}$ grain (0·000065 Gm.).

Pastilli Thymol contain $\frac{1}{32}$ grain.

Pigmentum Thymol.

Thymol 1, Ether 10, and Spirit 5, or Thymol 1, Petroleum Oil 18, used as pigments in ringworm of the scalp, whilst acting as parasiticides they dissolve the fat, loosen the hairs and thus help epilation. 2½ to 5% in a mixture of chloroform and olive oil also used.

Sapo Thymol St. G. H.

Thymol 5, Soft Soap 240, Alcohol to 480.

Thymaglycine. (*Martindale*). *Dose per os.*—10 to 30 minims (0·6 to 2Cc.).

A palatable preparation containing Sodium Benzoate 3, Glycerin 10, and Thymol Water 50%.

As such, or diluted is beneficial in rhinitis, pharyngitis, quinsy, to brush the gums, and in gastric and intestinal catarrh.

For spraying into the throat and nostrils, may be diluted 1 to 3 with water. For **vaginal irrigation** dilute with 20 times its volume of warm water. Colitis is treated with an irrigation diluted 1 in 6.

To ward off colds douche the nose with Thymaglycine as such or diluted 1 to 3 of water. In measles the necessity of wiping out the mouth with a preparation of this kind is often forgotten.

As a preventive against microbic infection—notably as anti-rheumatic treatment, it is most important to wash the nasal mucous membrane and the throat (tonsils in particular) with an antiseptic lotion.—W. P. S. Branson, B.M.J. ii./12,1429.

Colitis in children. 5 to 10 drops in paraffin or water well tolerated and effectual. It also acts well against threadworms and has been found of great value in whooping cough.

✱ **Glycothymoline** (T.M. 231933). Said to consist of Potassium Carbonate, Sodium Benzoate, Sodium Borate, smaller portions of Sodium Salicylate, Thymol, Menthol, Glycerin, and Alcohol, coloured with Cochineal. Employed in catarrhal conditions of the mucous membrane of the nose, throat, stomach, intestine, uterus and vagina.

The antiseptic power of Thymol is thought to be hindered by the presence of glycerin in preparations of this kind—*cf.* Glycerin Antiseptic Power *Vol. II.*

Spiritus Thymol. *Dose.*—3 to 15 minims (**0·2 to 1 Cc.**).

Thymol 1, Alcohol (90%) to 10; for medicating the wool of respirators. In scabies, where the infection is limited and recent, this, solution is suitable for short applications.

Volckmann's Thymol Solution.

Thymol 1, Alcohol 20, Glycerin 20. Dissolve and add to water 1,000. Used as a spray and antiseptic lotion, as for burns.

Unguentum Thymol.

L. H. has 20 grains to the ounce of Soft Paraffin. *Dissolved by heat.* Applied half strength to the skin, keeps off gnats, &c. Used in the later stages of eczema and for other skin affections.

Unguentum Thymolis Compositum St. Th. H.

Thymol 5, Boric Acid 30, Zinc Oleate 60, Hydrous Wool Fat 120, Yellow Soft Paraffin to 437·5.

Thymol Wool, also **Gauze,** 5%, are used as antiseptic dressings. The late Lord Lister's directions for charging gauze with Thymol,—the charging mixture being composed of Thymol 16, Resin 50 and Spermaceti 500 to be manipulated in a 'hot box.'—L. ii./13,1595.

Vapor Thymol, T.H.

Thymol 6 grains, Alcohol 90% 1 drachm, Light Magnesium Carbonate 3 grains, Water to 1 ounce. A teaspoonful to a pint of water at 140° F. for inhalation. Stimulant and antiseptic.

Thymol Carbonate.—*Syn.* **Thymotal.**

Dose.—5 to 15 grains (**0·3 to 1 Gm.**).

A nearly tasteless, colourless, crystalline powder. Is not dissolved by the stomach and therefore proves valuable as a remedy for *Ankylostomum duodenale,* common in Italy. May prove useful in obstinate cases of tænia and other intestinal worms. **Tablets** contain 10 grains.

Thymoform Tablets. *Dose.*—One occasionally.

Contain Thymol and Formic Aldehyde in a Cane Sugar basis as an antiseptic throat lozenge.

✱**Arhovin** (T.M. 280681).—Diphenylamin Ethylthymyl benzoate, $C_6H_4.C_{10}H_{13}.COO.C_2H_5.(C_6H_5)_2NH=451·272$. *Dose.*—4 minims in capsules. In gonorrhœa as bougies, 0·01 to 0·05 Gm. in each.

TINCTURÆ.

Tinctures are made by *percolating* the drug in more or less fine powder with the menstruum (usually alcohol) in a percolator, or by *macerating* in a closed vessel for a time with shaking or stirring.

We have proved experimentally that in many instances the same effects can be produced by a few hours maceration, as with the customarily prescribed 'seven days' or more. Compare our recent interesting important confirmation in respect of Digitalis Tincture, p. 397.

Non-Alcoholic, 'GLYCERIN,' or 'AQUEOUS' **Tinctures**

Some of these are in occasional demand, but the alkaloidal ones can have little activity, unless a suitable acid can be used to ensure their solution. The **Glycetracta**, with which we have experimented, should replace them.

Ethereal Tinctures of certain drugs are made, *e.g.*, Belladonna, Capsicum, Iodine and Menthol.

For the **dispensing of resinous tinctures** in mixtures, **Mucilage of Acacia** yields satisfactory mixtures with most Tinctures except in the case of Tinct. Benzoini Co., Jalapæ, Myrrhæ, and Tolu. The Mucilage is best diluted with as much water as possible, and the tincture then added.

If **Salts** be present in the mixture the above rule applies, except in the case of Cannabis, where Tragacanth Mucilage should be used. Tincture Podophylli requires no suspending agent in the absence of salts, but if any be present Mucilage of Acacia is best used.

Tragacanth Mucilage answers well for suspending Tinct. Jalapæ and Myrrhæ, but is useless for Tinctura Benzoini Co., Quininæ and Tolu. For Tinct. Benzoini Co. and Tinct. Tolu, the two mucilages combined are best. In the case of a mixture containing 1 drachm of resinous tincture to the ounce, dilute 1 drachm of Mucilage of Acacia with as much water as possible, add the tincture, and lastly add the Mucilage of Tragacanth.

Tinctura Hydrastis, which in absence of salts requires no suspending agent, should have an addition of Mucilage of Tragacanth if salts be present. Tinctura Lupuli and Tinctura Cimicifugæ require no addition either in presence or absence of salts.

Total solids and ash from a number of B.P. Tinctures.—P.J. ii./07,738.

Various Alcoholic strengths used in making Tinctures and their relative advantages.—A Dutch communication, P.J. ii./26,36.

TRAGACANTHA (*B.P.* '14).

Dose.—2 to 10 grains (**0·12** to **0·6 Gm.**) or more.

From *Astragalus gummifer* and some other species (*Leguminosæ*).

To detect acacia in tragacanth.—P.J. ii./04,453.

Gelanthum (Unna's Jelly).

Heat in a steam bath Tragacanth 110 grains, Gum Acacia 30 grains, Gelatin 120 grains, and Distilled Water 10 ounces, for 4 hours; press the paste through muslin, mix well and add Glycerin 6 drachms, heat again in a water bath for an hour, and add Thymol Water *q.s.* to 12 ounces.—Ph. Form. modified. This is similar to the formula in E.L. A basis for various antiseptic applications for skin medication.

Glycerin of Tragacanth (*B.P.* '14).

Tragacanth, in powder, 1, Glycerin 3. Mix, and add Water 1. Useful pill excipient. **Glucantha,** (was in **G.H.**). Tragacanth 240 grains, Water ½ ounce, Syrup of Glucose 2 ounces.

'Cremor-Sicc.' Preparations.—Desiccating Creams for application to the skin. A small portion rubbed on the part in a thin layer rapidly dries and forms a protective coating. The following medicaments can be incorporated in the basis:—

Adrenalin 0·1%, **Alum Acetate** 5%, **Argyrol** 2%, **Boric Acid** 5%, **B. Naphthol** 5%, **Cade Oil** 10%, **Capsicin** 2%, **Chrysarobin** 5%, **Cicatricine** 10%, 𝔇 𝔓1 **Cocaine** 2%, **Collargol** 2%, **Formosyl** 10%, **Ichthyol** 5 and 10%, **Ichthyol Resorcin** 5%, **Iodoform** 5%, **Lactic Acid** 5%, **Liquor Carbonis Detergens** 5%, **Menthol** 5%, Ⓟ**Mercuric Chloride** 1 in 5,000, Ⓟ**Mercuric Oxide Yellow** 2%, 𝔇 𝔓1 **Opium** 5%, **Phenol** 2%, **Resorcin** 2 and 5%, **Salicylic Acid**

2 and 5%, **Sulphur** 10%, **Thorium Hydroxide** 10%, **Thymol** 0·1%, **Xeroform** 5%.

The basis contains 25% of **Zinc Oxide.**

Cremor Emolliens. *Syn.* SKIN CREAM, U.C.H.

Tragacanth 1, Methylated Spirit 7, Glycerin 14, Olive Oil 3½, Simple Tincture of Benzoin 2, Water to 100.

Mucilago Tragacanthæ (*B.P.* '14).

Dose.—1 drachm to 1 ounce (4 to 30 Cc.) or more.

Improved formula suggested by the writer:—

Alcohol (90%) 120 minims. Put in a 20-ounce dry bottle and add Tragacanth, in powder, 60 grains. Shake till evenly moistened and add Distilled Water *q.s.* to 10 ounces. Shake again quickly to make a uniform mucilage. This keeps much better than mucilage of acacia. One part to 3 of aqueous fluid will suspend heavy powders. *Vide* also resinous tinctures.

Spirit of Chloroform instead of spirit is also suggested.

U.S. X. directs Tragacanth 6, Glycerin 18, Water to 100.

Mucilago Marantæ. *Dose.—Ad lib.*

Triturate Arrowroot 6 drachms with water 2 ounces to make a smooth paste and make up with boiling water to 1 pint. Heat until semi-transparent. Cool and add spirit of chloroform 2 drachms.

To suspend Bismuth and other suitable heavy medicaments this and a similar preparation of cornflour has been found useful. It will suspend bismuth salts in a proportion as high as 1 drachm to the ounce.—Cpl. Cattel.

Pulvis Tragacanthæ Compositus (*B.P.* '14).

A mixture of Tragacanth, Gum Acacia, Starch, and Sugar.

Dose.—10 to 60 grains (0·6 to 4 Gm.). Is used as last preparation, 10 grains to 1 oz., specially useful for bismuth oxynitrate.

TRITURATIONS, U.S.

Triturations are diluted powders of active substances made with Milk Sugar *1 in 10.* *Vide* Index for Triturations prepared and their doses.

Levigations are *Strength 1 in 50*:—

P1 Levigatio Aconitinæ (base)	*Dose* $\frac{1}{5}$ to $\frac{5}{6}$ grains.
P1 Levigatio Hyoscinæ Hydrobromidi ..	,, $\frac{1}{4}$,, $\frac{1}{2}$,,
P1 Levigatio Hyoscyaminæ (base)	,, $\frac{1}{2}$,, 1 ,,

TROCHISCI.

Lozenges are prepared with six different flavourings (*B.P.* '14). Those with **Fruit Basis** are prepared with Black Currant paste, Sugar and Tragacanth, but are harder than the Fruit Lozenges of commerce—viz., Benzoic Acid ($\frac{1}{2}$ grain), Catechu (1 grain), Eucalyptus Gum (1 grain), Guaiacum Resin (3 grains), Extract of Krameria (1 grain), and D P1 Extract of Krameria (1 grain), combined with Cocaine Hydrochloride ($\frac{1}{20}$ grain).

Simple Basis.—Sugar 496, Gum Acacia 19½, Mucilage 35, Water *q.s.* Used in—Ipecacuanha ($\frac{1}{4}$ grain), Reduced Iron (1 grain), and Santonin (1 grain).

Rose Basis is as above, but with addition of Otto. Used in—Compound Bismuth (Carbonate 2 grains), Potassium Chlorate (3 grains), and Sodium Bicarbonate (3 grains)—the last mentioned not *B.P.* '14.

Tolu Basis contains Tolu Tincture 10, Water 10, Sugar 482, Gum Acacia 19½, Mucilage 35½, Water *q s.* Used in Acid Tannic ($\frac{1}{2}$ grain), Phenol (Carbolic Acid) (1 grain), (B.P.,'98) Ⓟ Morphine(Hydrochloride $\frac{1}{32}$ grain). and Ⓟ Morphine Hydrochloride ($\frac{1}{32}$ grain), with Ipecacuanha ($\frac{1}{10}$ grain).

Orange (Tincture) is used to flavour Sulphur Lozenges (5 grains).
Lemon Juice with Sugar, Acacia and Tragacanth is used for Phenol Lozenges *B.P.* '14 (½ grain).

In the index those with 'R' have Rose basis; 'S' have Simple Sugar basis; 'T' have Tolu basis; 'G' have Gelatin basis, and are the commonly sold **Pastils** or **Jujubes** of oval or round shape (the latter are frequently "sugared"). *Vide* also **Pastilli Glycogelatin.**

UNGUENTA.

The principal **Ointment Bases** are:—**Lard, Benzoated Lard,** and **Lard with Oleic Acid** (for Alkaloids); **Paraffin, Soft (White** or **Yellow),** and **Hard Paraffin,** and their combination **Paraffin Ointment (White** or **Yellow)**; and **Wool Fat** (and **Hydrous**).

In addition Combinations of **Almond Oil, Beeswax (Yellow** and **White), Camphor, Glycerin, Olive Oil, Spermaceti, Prepared** and **Benzoated Suet, Palm Oil, Cocoanut Oil** and **Sodium Stearate** are used.

Unguentum Simplex (B.P., 1885) was composed of White Wax 2, Benzoated Lard 3, Almond Oil 3.

Goose Grease is quickly absorbed (*cf.* Anserine Mulls). Lanolin alone is absorbed very slowly, more ready when mixed with olive oil A little cedar wood oil in an ointment increases absorption.

Lard and Olive Oil are absorbed to the extent of about 15% after two minutes rubbing. Hydrous Wool Fat is absorbed 20% providing proper amount of water is present—the results were obtained by rubbing 10 grains on to a skin area of 20 sq. inches and scraping off with a razor and weighing the amount not absorbed.—R. B. Wild, B.M.J. ii./13,983.

A basis of **Hydrous Wool Fat and Glycerin of Starch** is largely absorbed. It is relatively non-greasy.

Lassar's Paste (*q.v.*) forms an excellent *Protective Ointment,* as also does a mixture of Hydrous Wool Fat 1 with Soft Paraffin 3.

The Ointments of the B.P.—E. W. Lucas—C.D. i./12,262—for a brief Abstract see Unguentum Paraffini.

***Eucerin** (T.M. 297268, 297270) **Anhydrous.**—A mixture of 5 parts of Oxycholesterins from Wool Fat with 95 Paraffin Ointment. This with an equal quantity of Water gives 'Eucerin Purum' miscible with other salves, etc.—Gehe.

For other ointment bases cf. Crembas, Adeps Lanæ, Mulls, Mollin, etc.

UREA.

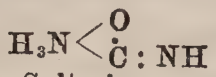
$CO(NH_2)_2$=60·048. *Syn.* CARBAMIDE.

Dose.—10 to 60 grains (**0·6 to 4·0 Gm.**), thrice daily, may be given in a mixture flavoured with lemon syrup, but much larger doses are commonly now given both in therapy and as diagnostic. Hypodermically a 1 in 6 solution has been given, but it is seldom used that way—*cf. ref. infra.* It forms colourless crystals.

Soluble 1 in 1 of water and in alcohol 90% about 1 in 7½.

Urea is synthesised by acting on Phenyl Carbonate [$CO(O.C_6H_5)_2$=214·08] with Ammonia, the products of the reaction being Urea and Phenol.

(Phenyl Carbonate is made by passing Phosgene, *i.e.*, Carbonyl Chloride,* into dilute Sodium Phenate solution). Wohler in the year 1828 succeeded in converting Ammonium Cyanate into Urea; it was the first animal product made by a purely chemical synthesis.

E. Werner holds that Urea is of the formula  $H_3N<\begin{matrix}O\\ \dot{C}:NH\end{matrix}$

This brings it into relation with Ammonium Salts in general, and makes Cyanic Acid the most significant decomposition product. Urea is omnipresent, even in the lowest form of plant life.—B.M.J. i./23,1020.

It may also be obtained from Calcium Cyanamide by hydrolysing with 10% H_2SO_4 at 50° C.—P.J. i./16,45.

Uses.—Urea has diuretic properties and is given to some extent in gout and kidney disease. In the past it was given in phthisis.

It has marked bactericidal properties and has been suggested for use to wounds. For the estimation of urea in urine *see Vol. II.*

Grave genuine NEPHROSIS (nephritis with œdema, without hypertension or hematuria). Complete recovery under treatment with Urea up to 100 Gm. daily.—D.m.W., Nov. 13, '25, per Jl. A.M.A., ii./25,2058.

A useful diuretic in doses of 30 to 60 Gm. a day in a small amount of water after meals in cases of heart failure with œdema.—Arch. Int. Med., Oct. 15, '25, per Jl. A.M.A., ii./25,1753. *See also* B.M.J.E., i./26,2.

Urea has lost the reputation for pronounced toxicity with which it was formerly endowed. After ingestion of 100 Gm. Urea by normal persons the Urea-Nitrogen of the blood can be raised to a figure comparable with that obtained in chronic nephritis. When blood Urea exceeds 70 mg. per 100 Cc., headache, dizziness and somnolence may occur. It can be given over long periods and has been administered in doses above mentioned in advanced cardiac decomposition. With continuous administration, daily urine volume can be maintained at almost constant level. Its use as a diuretic deserves greater popularity.—Jl. A.M.A., ii./25,2036.

SCAR TISSUE.—Best results in softening of, obtained by injection under non-adherent scars of a concentrated solution of Urea. Care necessary as necrosis caused when injected under an adherent scar.—Per Pr., Apl. '26,332.

Haustus Ureæ Composita (Urea Concentration Test) K.C.H.

Dose.—3½ ounces (**100 Cc.**), less for children.

Urea 4½ drachms, Tincture of Orange 15 minims, Water to 3½ ounces.

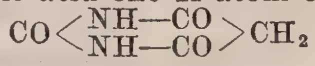
Thio-Urea. *Syn.* **Thiocarbamide** $CS(NH_2)_2 = 76{\cdot}112$. Obtained by heating dry Ammonium Sulphocyanide in an enamelled vessel to 170° C. for an hour, then cool rapidly and extract the unaltered Sulphocyanide with cold strong Alcohol and crystallise the residue repeatedly from hot water. Crystals soluble 1 in 10 in water—with difficulty in Alcohol.

$\boxed{\mathrm{P\,1}}$**Ureides.**—The designation in the Poisons Schedule is *"All Poisonous Ureides."* A Ureide is a compound of an Acyl (or Acidyl) radical with the residue of Urea thus:—

$NH_2CO.NH_2$	$NH_2CO.NH.CO.CH_3$
Urea.	Ureide of Acetic Acid.

Analogous are the Amides to Ammonia:—

NH_3	$NH_2.CO.CH_3$
Ammonia.	Amide of Acetic Acid.

When the Acyl radical is from a dibasic acid one H atom of each NH_2 may be replaced as in Barbituric Acid.  $CO<\begin{matrix}NH-CO\\ NH-CO\end{matrix}>CH_2$

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* **Carbonyl Chloride** *Syn.* **Phosgene**, $COCl_2 = 98{\cdot}914$.

A colourless gas with penetrating odour decomposed by water into hydrochloric acid and carbon dioxide.

Manufacture.—By warming a mixture of Potassium Dichromate 400 and Sulphuric Acid 3,200 in a vessel with reflux condenser and dropping in Chloroform 160 in small quantities at a time. It is available liquefied in cylinders.

This was one of the early (and most dangerous) gases used in the war. The treatment was venesection which was sometimes effectual. Warmth and stimulants required at the same time.

These are **Cyclic Ureides.** Some held that only these are involved. **Adalin** and **Bromural** are Ureides but not cyclic. *Any Alkyl, Acyl or Metallic Derivative of Barbituric Acid is included, even if proved to be non-poisonous.* We have reasons to regard Adalin, Bromural and other recent additions to the book as $\boxed{\text{P1}}$.

The name **Diureide** is usually given to bodies containing *two* urea residues, *e.g.* Uric Acid and Caffeine.

$\boxed{\text{P1}}$ **Barbitonum** (*B.P.* '14).—MALONUREA. *Syn.* DIETHYL-MALONYL UREA. DIETHYL-BARBITURIC ACID, P.G.VI., FR. CX. SUPP. 1920, P. HELV., P. SVEC., P. JAP. IV., Ph. Ned. V., P. Svec. X., BARBITALUM, U.S. X., MALONAL. ✱HYPNOGEN (T.M. 279688), DEBA, VERONAL.

Wholesale and retail vendors must label poison and treat otherwise as $\boxed{\text{P1}}$. (*Part I Poison since January,* 1918.)

$(C_2H_5)_2 : C : (CO.HN)_2 : CO$ or $C_8H_{12}N_2O_3 = 184{\cdot}112$.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**)—should be dissolved in hot water. *Bowels should be kept open and the kidneys in good working order.* P.G. VI. Max. single dose **0·75 Gm.** max., per diem **1·5 Gm.**; FR. CX. Supp. **0·5** and **1 Gm.** respectively.

Caution.—5 grains are sufficient for an ordinary case of insomnia. The symptoms of poisoning are—somnolence, unconsciousness, subsequently coma, cyanosis, cold extremities. 50 grains might be regarded as the average minimum fatal dose.

This substance is no longer a British Patent. Numerous patents have been granted for making it, *e.g.*, 1664/1903, 14,014/1904.

Manufactured by condensing Urea with the Diethyl ester of Malonic Acid. Malonic Acid is $CH_2(COOH)_2$.

Details may be found in—J. B. Cohen, Practical Organic Chem. *See also* our Edn. XVIII., p. 790.

Chemotherapeutic Index for Veronal, see p. 129.

A white crystalline powder melting at 191° C. (U.S. 187 to 190°), ***Soluble*** 1 in 145 water at 20° C., and about 1 in 9 of alcohol 90%, more soluble in hot water, and in alkaline solutions. *Boiling* with alkalis decomposes it. In Ether, 1 in 25. It is also soluble in Acetone and Acetic Ether. In Chloroform 1 in 35—by our experiments. Should dissolve in Sulphuric Acid without colouration and not cause colouration on shaking with Nitric Acid (organic impurities).—P.G.VI.

Uses.—Has a soporific action indicated in nervous restlessness, insomnia and depression, for maniacs and in cardiac troubles. Does not affect temperature or respiration. May cause erythema. Produces sleep without subsequent depression.—Cushny, 192. Tolerance to Veronal may be established in some cases.

In insomnia arising from pain 4 grains may be usefully combined with Atropine Methyl Bromide $\frac{1}{64}$ grain.

$\boxed{\text{P1}}$ **Malourea Tablets**, 5, 8 or 10 grains, or in Cachets. (*Caution*: for dose *v. antea*).

$\boxed{\text{P1}}$ **Suppositories** 4 to 8 grains (**0·25 to 0·5 Gm.**).

Antidotes.

Stomach pump, lavage and enemata. Coffee, Strychnine, later diuretics.

Treatment of acute Veronal Poisoning. If *within 4 hours* of taking the drug repeated lavage of the stomach with warm water, then introduce through the stomach tube a pint of hot strong coffee with some milk in it and an ounce of Castor Oil.

If patient is seen 6 *hours or so after taking the drug* the poison has passed into the intestine, but rapid washing out of the stomach and giving coffee may still be advised, unless patient is *in extremis.* Other measures—cardiac stimulants (Strychnine 1/30 grain with Digitalin 1/100 grain every 4 hours) warm Normal Saline subcutaneously, rectal injection of 15 oz. of Normal Saline containing 4% Glucose. If much cyanosis Oxygen. If pulse feeble Oxygen should be passed through a wash bottle of Absolute Alcohol. If urine is not freely excreted give Caffeine hypodermically. The coma may last several days—feeding, therefore, necessary with warm milk and coffee every 4 hours—either by stomach or nasal tube carefully passed.—Sir W. H. Willcox, L. ii./13,1178; Inter. Cong. Med., Aug., 1913.

Tests and Toxicological Analysis in case of Veronal Poisoning.—See Vol. II.; Org. Anal. Chart and Corroborative Tests.

Poisoning Effects.

A case of gangrene of the skin following a large dose of Veronal and Pyramidon.—L. ii./11,479.

Hemiplegia caused by Veronal in aged persons.—B.M.J. ii./10,375.

Veronal has the peculiar property of counteracting unpleasant effect of morphine.—L. ii./08,1223.

Veronal owes activity to Ethyl groupings—this body is more powerful than the corresponding Methyl Compound, whilst Proponal (*infra*) possesses the maximum activity in the group.—B.M.J. i./09,554.

Review of hypnotic drugs, Chloral bodies, Sulphone Compounds, Ureides, and other bodies with allied effects.—Sir W. H. Wilcox, B.M.J. ii./13,661.

Veronal 92½ grains taken with poisoning symptoms by a retired prize-fighter. Recovery. Treatment hypodermically Strychnine and Digitalin, stomach pump, lavage with weak Sodium Bicarbonate (tube passed with difficulty after warming and oiling it). Half pint strong black coffee and 2 ozs. brandy passed in, later hypodermic injections of Camphor Liniment (20 minim injections) every ¼ hour (latter valuable,—keeps the heart going and overdose is impossible) and more Strychnine.—B.M.J. i./13,280.

Another case, non-fatal after taking 125 grains in one dose, according to the patient. Treatment, lavage with dilute Permanganate; Atropine Sulphate 1/50th grain hypodermically repeated twice within two hours. The stomach washing was probably useless as absorption had presumably already occurred, yet he returned to consciousness after four days.—B.M.J ii./13,20

Veronal (*and Luminal*) RASHES.—Veronal should not be used in skin cases, especially of the bulbous type. Erythematous rash (in some areas it was sheet-like as result of coalescence) after Luminal, 3 grains a day.—G. Pernet, B.M.J. ii./13,312.

Rash following administration of 10 grains of Medinal every night for 3 nights.—P. W. Mathew, B.M.J., i./26,323.

Veronal poisoning—fatal case. Recovery of the drug from tissues and urine.—B.M.J. i./14,853. A case of recovery from 125 grains *ibid.* 854, and after 35 grains *ibid.* 856, and after 100 grains *ibid.* 1015.

For other cases see Edn. XVIII., p. 792.

Medinal poisoning, a case. Cumulative toxic effect same as Veronal.—L. i./26,391.

Recovery after taking as a single dose about 200 grains of Veronal. Complete unconsciousness lasted 113 hours and there were other grave symptoms.—S. M. Wells, B.M.J., ii./27,826.

Death from probably 50 grains of Veronal taken for sleeplessness in the belief by the victim that he could take more than most people.—A Deane, B.M.J., ii./27,192.

Dangers of the Barbituric Hypnotics.

Speaking generally, the Veronal derivatives are on the whole more powerful, and therefore more potentially dangerous, than Veronal itself, but a confused nomenclature makes it possible that a doctor who has found Veronal unsatisfactory, may turn to an alternative drug, and only learn by bitter experience that it is the same thing under a new name.—B.M.J., i./25,128.

Reasons of Veronal poisoning—its potency, no evidence of habit, delayed action, and that in every case of death the victim has tried to procure immediate sleep.—G. Archdall Reid, B.M.J., i./25,630.

In patients with any cardio-renal affection, Veronal and other hypnotics must be given with caution, as their excretion must be necessarily delayed. A case mentioned in which there was ophthalmoplegia as well as coma after taking 14 grains.—E. P. Scott, L. i./25,658.

Discussion on Barbituric derivatives and allied hypnotics.—G. Malcolm Dyson, P.J., i./26,385.

Medinal found innocuous and stated to be rapidly absorbed and eliminated. —L. i./26,464.

The average dose of Veronal in fatal cases has been 50 grains. As little as 10 grains has caused death. The group is apt to produce signs of organic paralysis, albuminuria may occur, and a common occurrence with an overdose is the development of broncho-pneumonia. Veronal taken every night is liable to produce mental and moral changes with suicidal tendencies, also diplopia with visual paralysis and the kind of speech found in G.P.I.: a characteristic feature of Luminal is hæmatoporphyrinuria. Continued administration of these drugs ***produces pathological changes*** in the ***central nervous system,*** which, although they usually disappear when dose is discontinued, may become permanent. The resemblance between the comatose condition produced by them and the condition of normal sleep is only superficial and under these drugs the margin between sleep and fatal coma in cats is a very narrow one. There is definite ***evidence of cumulative action,*** and tolerance is never established. Danger not properly recognised : should be ordered only on prescription marked ***'Not to be repeated,' and covering only 6 doses.*** Patient should be warned against daily doses and should receive ***only one each week.*** Warning to practitioners *re* glowing advertisements, which are seriously misleading to the profession and a grave danger to the public.—Sir Wm. H. Willcox, B.M.J., i./27,877; L. i./27,1037.

No addiction or ill-effects observed with Medinal.—M. Craig, B.M.J., i./27,983; *see also ibid.* 1031,1083, and especially 1125 and 1163.

In *therapeutic* doses these drugs may have no toxic effect on metabolism and no cumulative action.—C. Worster-Drought, L. ii./27,768.

P1 **Veronal-Sodium.** *Syn.* BARBITALUM SOLUBILE U.S. X., Ph Ned. V. ✱MEDINAL (T.M. 304403). P.G. VI., P.Svec. X. $C_8H_{11}NaN_2O_3=206{\cdot}101$.

Dose.—5 to 10 grains dissolved in water either before or not less than one hour after meals. In most cases 5 grains is sufficient for an adult. P.G. VI. has max. single dose 12 grains (**0·75 Gm.**) approx. (*i.e.* the same as for Veronal).

Wholesale and retail vendors must label "Poison" and treat otherwise as **P1**.

PATENT 19,411/1904 and 2566/1905 became void in 1913.

Manufacture.—Rub down Diethylbarbituric Acid 184 Gm. in a mortar with about 200 Cc of water and then add Sodium Hydroxide pure 40 Gm. previously dissolved in water *q.s.* and *estimated.* It should be as free from CO_2 as possible. Evaporate to dryness on water bath. It may be regarded as an acid salt. If a proportion of alkali sufficient to make the Di-Sodium body is used, decomposition sets in on drying.

White crystals soluble 1 in 5 in cold water. It has properties and uses similar to Veronal *antea.* It is useful in sea-sickness.

Incompatible with Ammonium salts, *e.g.*, the Bromide, and with acids. In preference, give it alone.

P1 **Veronal-Sodium Tablets** are made, 1, 2½ and 5 grains (**0·06, 0·15** and **0·3 Gm.**).

Hypnotic effect is also obtained by the use of **Suppositories** medicated with **0·4—0·5 Gm.**

Even small doses, *e.g.*, 1 grain three times a day, in some instances, produce a lengthy sleep—at night.

It is stated that toxic signs do not appear with less than 15 grains daily, whilst an adequate sedative effect at the menopause is obtained with 1 to 2 grains three times a day, half an hour after meals.—J. H. Hannan, Pr., Oct. '27,263.

Sea-sickness. Veronal 8 grains or Sodium-Veronal which acts faster, taken on board, is valuable.—T. Zangger, L. ii./21,630.

Animal experiments show that fear and excitement definitely diminish the soporific action of Medinal.—Per P.J., i./25,444.

Ⓟ✱**Veronigen** (T.M. 374804). *Dose.*—1 drachm (**4 Cc.**) diluted about one hour before going to bed. For nervous sleeplessness in children 10 to 20 minims diluted. A liquid preparation of Veronal as hypnotic.

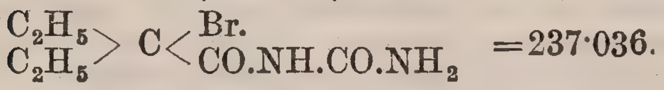
Ⓟ**Neurinase.** *Dose.*—(As hypnotic or sedative) 1 drachm (**4 Cc.**) in the morning and 1 to 4 drachms (**4 to 15 Cc.**) at bedtime. 1 drachm contains 2½ grains approximately (0·15 Gm.) of Veronal.

A preparation of Veronal with Valerian suggested for use in nervous insomnia and neurasthenia.

P1 **Chineonal** is QUININE DIETHYL-BARBITURATE.

Dose.—10 grains (**0·6 Gm.**) for adults, in fevers, neuralgia, etc.

P1 ✱**Planadalin** (T.M. 409581). *Syn.* CARBROMALUM U.S. X., URADAL, BROMODIETHYL-ACETYL-UREA, ADALIN, Ph. Ned. V., P. G. VI. (no dose), P. Svec. X., NYCTAL.



$$\begin{matrix} C_2H_5 \\ C_2H_5 \end{matrix} > C < \begin{matrix} Br. \\ CO.NH.CO.NH_2 \end{matrix} = 237·036.$$

We consider this a P1 Poison, see also p. 816. A further note is given Edn. XVIII., p. 793.

Patent 2888/1910 Expired. 'Adalin' is no longer on the T.M. Register.

Dose.—As sedative 5 to 10 grains (**0·3 to 0·6 Gm.**) *t.d.s.*; as hypnotic 10 to 15 grains (**0·6 to 1·0 Gm.**) followed by hot drink half an hour before bedtime. Tablets, 5 grains each.

Tasteless crystalline powder. M.pt. 115°—116° C. Soluble 1 in 5,000 in water. A hypnotic of medium strength. The cyclic structure of the urea derivative of Diethyl Malonic Acid (Veronal) according to E. Fischer makes it a much more powerful hypnotic than Diethyl Acetic Acid, of which Adalin may be looked upon as a derivative.—B.M.J. ii./13,48.

Much less toxic than the allied compounds.—Sir W. H. Willcox, B.M.J., ii./27,1141.

P1 **Proponal.** *Syn.*—DIPROPYL-BARBITURIC ACID.

$(C_3H_7)_2C(CO.NH)_2CO=212·144.$

Dose.—2 to 8 grains (**0·12 to 0·5 Gm.**). P1 **Tablets** 1½ grains.

Wholesale and Retail Vendors must label "Poison" and treat otherwise as P1.

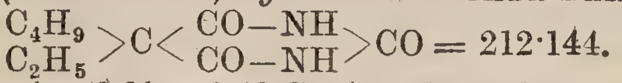
Manufacture.—Probably made under the Veronal patents (expired) but no licence was registered at the British Patent Office.—C. D.

A homologue of Veronal in white crystalline powder, as hypnotic, very slightly soluble in water, more so in Alcohol. It is readily dissolved by alkalis—hence probably acts on reaching the intestine.

Very narrow margin between therapeutic and toxic dose. *Whilst 5 to 6 grains are hypnotic, 7½ grains approximates danger zone.*

More poisonous than Veronal.—Sir W. H. Willcox, L. ii./13,1180.

P1 ✱**Sonéryl** (T.M. 432474) *Syn.* Butyl-Ethyl-Barbituric Acid.



$$\begin{matrix}C_4H_9\\C_2H_5\end{matrix}>C<\begin{matrix}CO-NH\\CO-NH\end{matrix}>CO = 212{\cdot}144.$$

Dose.—1 to 2 grains (**0·06 to 0·12 Gm.**) produces sleep in half an hour, in addition, there is marked analgesic effect on pain. It may be given at any time, but in no case less than ½ hour after food. A larger dose, *e.g.*, 3 grains (**0·2 Gm.**) gives a deep sleep lasting some time. In pain from wounds 3 to 4 grains may be used. In delirium 2 grains. *Max.* in 24 hours, 4 grains. **P1** **Soneryl Tablets** 1 grain are made.

A white, crystalline powder with slight bitter taste. Soluble 1 in 300 of water. Said to be three times as active an hypnotic as Veronal.

For *rectal use* **Suppositories** 0·1 Gm. *Subcutaneously*, a **Piperazine** compound, containing 0·05 Gm. (of the compound) in each Cc., is used. *Intravenously*, 0·1 Gm. in 20 Cc. of Normal Saline.

It has not the toxicity of Morphine and is not habit-forming.—P.J. i./23,170.

P1 ✱**Dormigene** (T.M. 367615). ✱Bromural (T.M. 284555). *Syn.* **α-Brom-iso-Valerianyl Urea.** P.G. VI., Ph. Ned. V., P. Svec. X.

$(CH_3)_2CH.CHBr.CO.NH.CONH_2=223{\cdot}02.$

Patent 942/1907. It may be prepared by condensing the chloride of α-Brom-iso-Valeric Acid with Urea:

$(CH_3)_2CH.CHBrCOCl + (NH_2)_2CO = (CH_3)_2CH.CHBrCO.NH.CO.NH_2 + HCl$

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**).

Colourless crystals, soluble with difficulty in water, dissolved by Caustic Soda and precipitated by acids from its solution in alkali. M.pt. about 145° C. (by our expts.). Contains about 36% Bromine. Is said to induce sleep which commences in from 5 to 25 minutes after taking and lasts from 4 to 5 hours, at the expiration of which natural sleep follows, the action of the drug having ceased in that time.—B.M.J.E. i./07,75.—B.M.J. i./09,554.—L. ii./08,1223.

P1 **Dormigene Tablets** contain 5 grains (**0·3 Gm.**).

This and Adalin cause a diminution in blood pressure, but are without effect on the heart,—experiments on rabbits. Adalin is the more lethal.—J.C.S.A. i./13,1023.

P1 ✱**Allonal** (T.M. 428271). A combination of Allyl-isopropyl-Barbituric Acid 1 grain and Amidopyrin 1⅔ grains, in tablets.

Dose.—1 to 2 tablets as sedative or hypnotic in simple cases of insomnia; 2 to 4 as analgesic and hypnotic. 'Worked better than Morphine.'—M. A. Burns, N.Y. Med. Jl., Apl. 19,22.

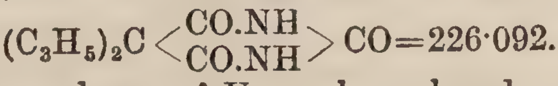
Ⓟ**Somnifen.** (✱Somnifaine is T.M. 453520). A solution of the Diethylamine Salts of allyl-isopropyl-barbituric acid and Veronal.

Dose.—2 Cc. intramuscularly deeply. In twilight sleep to be preceded by Morphine ¼ grain and Hyoscine 1/100 grain. Considerable risks are attached. Any improvement only temporary.—W. S. Dawson and M. R. Barkas, L. ii./26,1155.

Intravenously or intramuscularly produces deep sleep lasting a number of hours.—L. ii./26,662.

For surgical anæsthesia 0·01 Gm. per kilo intravenously, never passing 0·07 Gm. It must be combined with Morphine hypodermically.—I. Macdonald, L. i./26,463.

P1 **Dial.** (✱Dial-Ciba T.M. 381421.) *Syn.* **Diallyl-Barbituric Acid.** P. Svec. X. with max dose 0·3 Gm.



$$(C_3H_5)_2C<\begin{matrix}CO.NH\\CO.NH\end{matrix}>CO=226{\cdot}092.$$

A further homologue of Veronal employed as hypnotic. **Tablets** contain 1½ grains. Dose one half to three tablets in water.

Insomnia well treated by di-allyl-barbituric acid—a tablet on the tongue with a salt spoon of cognac emulsifies and is easily taken. Preferable to other hypnotics. It is relatively assimilated while Veronal is passed to the extent of 80% as such !—Watson Smith, P.J., i./18,219.

Recovery after taking 2·7 Gm. of Dial.—B.M.J.E., ii./26,103.

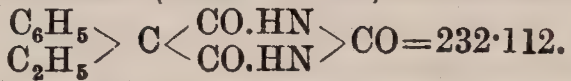
$\boxed{\text{P1}}$ ✱ **Dialacetin** (T.M. 379525). Hypnotic and antineuralgic, analgesic and Antipyretic.—M.P.C., May 2/22,362

Tablets contain 4 grains of Allylparacetaminophenol and 1½ grains of Dial. Nocturnal fits in epilepsy often respond to this (½ to 1 tablet at night, or twice daily) when other remedies fail.—C. Worster-Drought, L. ii./25, 892,1095.

$\boxed{\text{P1}}$ ✱ **Didial** (T.M. 376649). Tablets contain 1/3 grain of Diallylbarbiturate of Ethylmorphine, and 1½ grains of Dial.

One to 3 tablets employed for the induction of *Twilight Sleep.*

$\boxed{\text{P1}}$ ✱ **Luminal** (T.M. 337916).—PHENYL-ETHYL-BARBITURIC ACID. P.G. VI., Ph. Ned. V., P. Svec. X. *Syn.* Phenobarbitalum, U.S. X. ✱ **Gardenal** (T.M. 412226) is the French equivalent.



$$\begin{matrix}C_6H_5\\C_2H_5\end{matrix}\!> C<\!\begin{matrix}CO.HN\\CO.HN\end{matrix}\!>CO=232{\cdot}112.$$

Wholesale and retail vendors must label "Poison" and treat otherwise as $\boxed{\text{P1}}$.

Dose.—In simple insomnia 1½ to 5 grains (0·1 to 0·3 Gm.) dissolved in hot water, where there is excitement 5 to 6 grains up to 12 grains (0·8 Gm.)—latter is *maximum dose.*

A modification of Veronal, an Ethyl group being replaced by a Phenyl radical, hence the action is intensified. (Details of synthesis.—J.A.C.S. 1918, 40,723.) White powder with slight bitter taste, almost insoluble in water. ***Soluble*** in Alcohol 90% 1 in 15, Ether 1 in 40, Chloroform 1 in 50—by our experiments.

Uses.—Hypnotic in conditions of excitement, in sleeplessness associated with pain, migraine, chorea, children's convulsions, in mental conditions, etc. Bowels to be kept open and kidneys in good working order.

For references to its use, and toxic effects, see under Luminal-Sodium.

Luminal Tablets ¼, ½, 1 and 1½ grain are made.

$\boxed{\text{P1}}$ ✱ **Luminal-Sodium.**—P.G. VI., P. Svec. X. $C_{12}H_{11}O_3N_2Na$ $=254{\cdot}101$.

Dose.—Per os 1 to 2 grains (0·06 to 0·12 Gm.), once a day.

Hypodermically ½ to 3 grains (0·03 to 0·2 Gm.) daily in 20% solution is used, *e.g.*, in epilepsy, but the matter is *sub judice.*

P.G. VI. states max. single dose 6 grains (0·4 Gm.); *pro die* 12 grains (0·8 Gm.).

A white crystalline powder, readily soluble in cold water. Solutions must be freshly prepared with cooled boiled water.

Incompatible with Ammonium Salts, *e.g.*, the Bromide and Acids salts and otherwise as caustic alkalis. In preference give it alone.

Luminal is more poisonous than Veronal.—Sir W. H. Willcox, L. ii./13,1180.

Luminal-Sodium Tablets 1 grain are made.

Epilepsy. 125 cases compared under Sodium Luminal and Bromide. Patients with diurnal fits whilst under Bromide showed marked reduction of the number under Luminal. They felt brighter. Cases with more than four fits a month also showed improvement but not so marked, and so on. 35 were either not improved or deteriorated while the remainder did better under Luminal. The cases least affected were those whose fits occurred in outs at considerable intervals. A class of epileptics probably exists who are more refractory to bromide treatment than others. Dose used, 6 grains a day of the Sodium salt. It would be converted into the acid by the acidity of the gastric juice. Giddiness and drowsiness sometimes observed. No signs of formation of habit.—F. Golla, B.M.J. ii./21,320.

Given in solution with hot milk or water, in doses of one or two grains once a day, usually at bedtime. Continental observers consider 3 to 4½ grains can safely be given to adults over prolonged periods under adequate supervision. Reduction in fit incidence and increase in weight. Best results in cases of major epileptic attacks.—J. Tylor Fox, L. ii./21,558.

Some say it is at best a palliative and not a specific.—Jl. A.M.A., Aug./20, 588; Pres., Feb./21,67.

Used in epilepsy of varied types even where large doses have to be given in an attempt to influence forms of mid-brain tremor—with good effect.—W. Johnson, L. ii./22,275. To give more than 4 or 5 grains a day, in general, is to ask for toxic effects—*ibid.*, 288.

It arrests seizures but also checks normal play of the nerve centres and is liable to produce a physical and mental torpor. L. Cheinisse, La Presse Med., Jan. 14/22, see also Ther. Gazette, Dec. 21—the drug thought not to cure; prolonged use dangerous and withdrawal requires care.—C. D., June 17, 1922, p. 66.

Admirable in cases of convulsions; lessens number of attacks, and in some cases stops them. Reputed danger in sudden suppression of Luminal is exaggerated. Depression and complications are due to too strong doses—doses vary according to age of patient and intensity of malady.—B. Conos, La Grèce Médicale, July—Aug., '22, per Jl. Trop. Med., Dec. 1/22,383.

Never more than 1½ grains to start.—J.A.M.A., Sept. 22,788. As palliative superior to bromides. Should be discontinued gradually.—per Pres. Jan. '23,23.

Except in epilepsy, Luminal is very disappointing. A sudden cessation may cause the same symptoms as a large dose.—S. Grossman, L. ii./25,677.

In major type of fits useful, but is of no value in hysterical fits. Tolerance is apt to occur, so that the results in the first 3 months may be the best. Outside a resident institution, 3 to 4 grains should be made the maximum dose in 24 hours.—L. ii./25,713. See also *ibid.* 728, 840, 892, 943.

Status epilepticus well treated by hypodermic injection of Luminal-Sodium from ½ to 3 grains. Solution should be freshly prepared.—W. J. T. Kimber, B.M.J. i./26,16.

Some striking results: stopping its use followed by an increase of fits.—J. Tylor Fox, L. ii./27,589. See also W. Johnson, L. ii./27,733.

Migraine.—Bromide failed in migraine, and in a few cases Aspirin, and in others Pyramidon (gr. vii.) with Cannabin Tannate (gr. iii.) cut short the duration of the headache. True migraine, which in its characteristic type is notably hereditary, has been treated with best success by Luminal. The dose, as a rule, should not be more than ¾ grain thrice daily at first, reduced to twice daily after a fortnight if the result is good, and later to once daily at bedtime. After a week various cutaneous rashes may be seen, but are unlikely if the above dosage is not exceeded.—Wilfred Harris, B.M.J. ii./22,786. See also R. Hearn, B.M.J. ii./22,893.

Arterial blood-pressure in 85% of cases of hypertension, decreased by Phenobarbital. Large doses produce marked toxic symptoms.—Per Jl. A.M.A. ii./25,1427.

Toxic Effects of Luminal.

Scarlatinaform rashes produced by Luminal 1 grain *bis die.*—I. Sachs, B.M.J. ii./25,1098.

Eruption resembling measles following use of 0·1 Gm. of Luminal-Sodium daily for 11 days.—Per Jl. A.M.A., ii./25,707.

Dermatitis, with total loss of hair and nails, following daily administration for three weeks of 0·1 Gm. Luminal.—B.M.J.E., ii./24,58. *See also* Jl. A.M.A., i./22,1199, Pres., Jan. '23,23.

A case of Luminal poisoning.—L. ii./25,596.

It has generally been found that the effective dose of Luminal is very near the toxic dose, more than 3 grains daily producing ataxia.—J. H. Hannan, Pr., Oct. '27,262.

Ⓟ**Theominal.**—A combination of Theobromine 0·3 Gm. and Luminal 0·03 Gm. has been used in angina pectoris.—Per Pres., Feb. '27,70.

***Elbon-Ciba** (T.M. 343704). CINNAMOLYL-*p*-OXYPHENYLUREA. $C_6H_5.CH:CH.CO.OC_6H_4.NH.CO.NH_2 = 282·128$.
Insoluble crystals, stated to have antipyretic and antiseptic action. Used in pulmonary tuberculosis (60 grains daily increased), for infectious catarrhs of respiratory tract, and in chronic endocarditis.

Asthma. Relief in long-standing cases—30 to 60 grains a day.—B.M.J. i./25,641.

Dibromin. *Syn.* DI-BROM-MALONYL-UREIDE $Br_2:C:(CO.NH)_2:CO. = 285·864$.

White crystals, containing approx. 56% Bromine, in capsules containing 6 grains (0·4 Gm.). In contact with infected tissues the Bromine is liberated and exerts an oxidising effect on micro-organisms. Its solutions are practically non-irritating and do not coagulate serum. Used for irrigations, wet dressings, moist packings, douches and gargles in solutions of 1 : 10,000 to 1 : 500. Advisable to begin with weak solutions, gradually increasing strength as the irritability of the tissues subsides.

In presence of 1% Peptone solution the Rideal Walker Coefficient is reduced to 0·8 compared with 50·0 in the absence of organic matter. Hypochlorites and Permanganates are also greatly reduced in germicidal power in presence of organic matter.—M.P.C., Nov. 19, '24,412.

$\boxed{\text{P1}}$ URETHANE.

$\boxed{\text{P1}}$ *All "Poisonous" Urethanes. Wholesale and retail vendors must label "Poison" and treat otherwise as* $\boxed{\text{P1}}$.

$CO(OC_2H_5)NH_2 = 89·064$. *Syn.*—**Ethyl Carbamate,** FR. CX.
Dose.—10 to 60 grains (**0·6 to 4 Gm.**). **Tablets,** 5 grains (**0·3 Gm.**).

Colourless crystals (M.Pt. 48-50° C), inodorous, with saline taste.

Manufacture.—By heating several hours in an autoclave or metal tubes, Urea Nitrate in excess of Absolute Alcohol at 120 to 130° C. and extracting first with water and this solution with Ether several times, Ammonium Nitrate is formed. Distil to rectify (B.pt. 180° C. without decomposition). $CO(NH_2)_2.HNO_3 + C_2H_5OH = NH_4NO_3 + CO(OC_2H_5)NH_2$—Bunte Zeit. f. Chem., A. 151,181.

Incompatible with Caustic Alkalis and with Acids. ***Soluble*** 1 in 2 of Water; 1 in 1 of Alcohol 90%. FR. CX. states 1 in 1 of Water and 1 in 0·6 of Alcohol (95%).

Uses.—Hypnotic, produces normal sleep, the heart is not affected; especially suitable for children; in cases of delirium tremens, and in acute mania and tetanus.

Urethane injected hypodermically into animals is said to produce complete insensibility to pain so that any operation can be performed with perfect safety. It is said not to cause heart failure or sickness.—From *The Times* per P.J. i./14, p. 393.

Quinine Urethane, see p. 731.

VALERIANÆ RHIZOMA (*B.P.* '14), U.S. X.

The dried rhizoma and roots of *Valeriana officinalis* and of *V. Wallichii* (**V. Indica**), (*Valerianaceæ*), collected in the autumn. Contain volatile oil and two alkaloids.

Alcoolature Stabilisée de Valériane (and a similar preparation of Æsculus Hippocastanus, the horse chestnut) are now in FR. CX., Nouv. Supp., 1926. The Valerian preparation is made by adding the fresh entire roots to 95% alcohol, equal parts by wt., while maintained boiling on the water bath for 20 minutes, allowing to cool and repeating the process; finally making up any loss. (In the case of the Horse Chestnut Alcoolature, the fresh non-decorticated chestnuts (Marron d'Inde) are used, employing 75% alcohol throughout.) No doses are given. Other Alcoolatures, *e.g.*, d'Aconit, d'Anémone Pulsatille, are in Fr. Cx. (1908).

The late Prof. Bourquelot suggested the method to destroy the enzymes and yet to retain the other natural constituents of the drug.—C.D., Aug. 5/22,208.

If the enzyme be killed by stabilising before drying, the root has only a small degree of odour. Either fresh Valerian or the stabilised article said to be best clinically.—Prof. van der Wielen, C.D. ii./16,911. We tried the procedure on a cwt. of fresh Valerian recently (1927) and must confess the ultimate dried root and liquid preparations had little less odour than the customary preparations.

Cultivation. The growing plant has slight odour of meadowsweet. — R. Glode Guyer, P.J. i./21,190.

History and therapeutic properties of Valerian.—N. Smodlaka, P.J. ii./21, 402.

Oil from **Indian Valerian Root** contains a sesquiterpene hydrocarbon and a small quantity of sesquiterpene alcohol. Combined Valerianic Acid and Formic Acid and a small quantity of free Valerianic Acid and other constituents present.—K. Bullock, P.J., ii./26,152.

Extractum Valerianæ Liquidum. 1=1 Hydro-alcoholic.
Average dose.—30 minims (**2 Cc.**).

Extractum Valerianæ.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**), is made by concentrating the last mentioned.

Mistura Valerianæ Composita, R.F.H.—Tincture of Valerian 3, Fœtid Spirit of Ammonia 2, Camphor Water to 48.

Oleum Valerianæ. *Dose.*—1 to 5 minims (**0·06 to 0·3 Cc.**). Yellowish colour. Sp. Gr. 0·94. In flatulence and nerve complaints.

Tinctura Valerianæ Ammoniata (*B.P.* '14). 1 in 5. *Dose.*—½ to 1 drachm (2 to 4 Cc.). U.S.X. 1 in 5 of Sal Volatile. An antispasmodic and nervine tonic.

Flavoring.—Glyl Coriandri, Glyl Menthæ Piperitæ, Syrupus Zingiberis, Extractum Glycyrrhizæ Liquidum, Tinctura Carminativa.

Tinctura Valerianæ, U.S.X.

Average dose.—1 drachm. 1 in 5 of a mixture of Alcohol (94·9% Vol.) and Water in proportion of 3 to 1.

Acidum Valerianicum, Fr. Cx., P. Helv. *Dose.*—1 to 5 minims (**0·06 to 0·3 Cc.**), in syrup or in gelatin capsules. Consists principally of optically inactive Isovalerianic Acid $(CH_3)_2.CH.CH_2.COOH$. with more or less dextrorotary Methyl-Ethyl Acetic Acid, $(C_2H_5)\ (CH_3)-CH : COOH = 102{\cdot}085$.

An oily liquid, Sp. Gr. about 0·93. Given in hysteria and nervous affections.

Ferri Valerianas. $Fe_2\ (C_5H_9O_2)_2(OH)_4 = 381{\cdot}856$.

Dose.—3 to 15 grains (**0·2 to 1 Gm.**).

A nervine stimulant and emmenagogue, and is used in anæmia.

Sodii Valerianas. $C_5H_9O_2Na = 124{\cdot}069$.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

In white crystals; used as a nervine sedative.

Zinci Valerianas. ZINCI VALERAS.

$(C_4H_9COO)_2Zn$=267·524. (**B.P. '14**+$2H_2O$).

Dose.—1 to 3 grains (**0·06 to 0·2 Gm.**).

White powder or in pearly crystals, very slightly soluble in water. Soluble in alcohol. Pills 3 grains each.

This is given as a nerve and general tonic, *e.g.*, after hay fever, and as prophylactic, but pharmacologists say it has no efficacy.

Incompatible.—Acids and metallic salts. (*See also* zinc salts.)

Amyl Valerianate. Iso-valerianic Iso-amyl Ester.

$C_5H_{11}.C_5H_9O_2$=172·16. *Dose.*—2 to 5 minims (**0·12 to 0·3 Cc.**) in capsules or diluted in alcohol.

A mobile liquid, Specific Gravity 0·858. Miscible with Alcohol. Is employed as a sedative and antispasmodic. Has been recommended as gall-stone solvent. In trade is known as 'Apple Essence.'

Elixir Valerianæ et Bromidi.

Dose.—½ ounce (**15 Cc.**) diluted.

Valerian Extract (Recent) 5 grains, Sodium Bromide 5 grains, Calcium Glycerophosphate 5 grains, Aromatic Elixir 2 drachms, Peppermint Water to ½ ounce.

A sedative preparation.

Borneol-isovalerianate. *Syn.* HYSTEROL.

Gelatin capsules contain 4 grains. A valerian substitute. In neurasthenia, hysteria, etc. The action of Borneol is to diminish reflex irritability while valerianic acid acts as antispasmodic. Best taken after meals to prevent eructations.

𝔇 𝔓1 **Trivalin.**—*Dose per os* 8 minims (**0·5 Cc.**), *hypodermically* 8 to 15 minims (½ **to 1 Cc.**), once to 3 times daily.

A solution of Valerianic Acid with Morphine Valerianate 1/3 grain (0·02 Gm.). Caffeine Valerianate 1/18 grain (0·0037 Gm.), Cocaine Valerianate 1/12 grain (0·005 Gm.), in 1 Cc. Said to have the therapeutic effects of Morphine without disadvantages. Anodyne, *e.g.*, in painful dressings inoperable cancer, gall-stone, colic, and neuralgia. As tonic in delirium mania and hysteria.

𝔇 𝔓1 **Tablets** are made = ¼ Cc. of the above.

The combination is in the proportion of one molecule each Caffeine Valerianate and Cocaine Valerianate and 4 molecules Morphine Valerianate. Overlach made a study of the combination of drugs to bring out and intensify beneficial action of each.

𝔇 𝔓1 **Trivalin** is made in combination with **Hyoscine Valerianate** 1/115th grain (0·00056 Gm.) per Cc., for treatment of the insane. *Dose.*—0·25 to 0·5 Cc.

Commercial Valerianates estimated by distillation using Sodium Acid Sulphate. Menthyl Valerianate requires hydrolysis first.—H. D. Richmond and W. T. T. Ainsworth B.P. Conf. 1919.

ZINCUM.

Zn=65·38.

To prepare **Arsenic-free** melt in a clay crucible and add about 15 grains of Sodium to a pound in small bits at intervals. Remove the scum, avoiding iron implements, and repeat in another clean crucible. Granulate by pouring into water when almost solidified.

Metabolism.—Zinc takes a part in the normal metabolism of plants and animals. Corn deprived of Zinc becomes chlorotic: it acts as a catalytic fertiliser for maize: animals on a Zinc-free diet do not flourish: the Zinc content of yolk of egg, milk, and spermatic fluid, is high.—L. ii./26,191.

Abnormal amounts of Zinc may enter and leave the body for years without causing symptoms detectable clinically or by laboratory examinations.—L. ii./26,530.

Incompatibilities of Zinc Salts.—Alkaline carbonates, and alkalis in general, vegetable infusions and milk.

Antidotes.—Alkaline Carbonates in warm water, Demulcents, Milk and Egg, Tea and Tannin solutions.

Zinci Acetas.

$(CH_3COO)_2Zn.\ 3H_2O=237{\cdot}476$. *B.P.* '14 and U.S. have $2H_2O$.

Dose.—1 to 2 grains (**0·06 to 0·12 Gm.**) as a nervine tonic, but pharmacologists have no evidence of its utility. 10 to 30 grains for an emetic dose.

White crystals with faint acetous odour. Soluble in water 1 in 2·5, about 1 in 40 of alcohol 90%. Used as astringent lotion (¼ to 1%).

Zinci Benzoas. $Zn(C_6H_5.COO)_2=307{\cdot}46$.

White powder, soluble in water. Examination of.—P.J. ii./13,686.

Zinci Bromidum, $ZnBr_2=225{\cdot}212$.

Dose.—2 to 5 grains (**0·12 to 0·3 Gm.**) in water.

White deliquescent powder. A little dilute hydrobromic acid will make a clear solution. Incompatible with alkaloids and salts of heavy metals. Has been used with success in epilepsy.

Zinc Carbonas.

$ZnCO_3.(ZnH_2O_2)_2,H_2O=342{\cdot}188$.

Employed for tender surfaces, and to check perspiration.

Ⓟ **Zinci Chloridum** (*B.P.* '14). $ZnCl_2=136{\cdot}294$.

Ⓟ *Zinc Chloride and liquid preparations of Zinc Chloride except preparations intended for soldering or other industrial purpose, provided they are contained in closed vessels labelled "Poisonous," and bearing the name and address of the seller and the special purpose.*

In deliquescent masses soluble 1 in 0·34 of water.

Ⓟ **Causticum Zinci Chloridi.**

Zinc Chloride 4, Solution of Antimony Chloride 2, Starch 1, Glycerin *q.s.*

Ⓟ **Collodium Zinci Chloridi.** 1 in 6 of collodion.

Ⓟ **Collutorium Astringens, R.D.H.**

Zinc Chloride 5 grains, Zinc Sulphate 10 grains, Water to 1 ounce.

Ⓟ **Guttæ Zinci Chloridi, R.O.H.** 0·125, 0·25 or 0·5% and $\boxed{\mathfrak{D}}$ $\boxed{\mathfrak{P}1}$ 0·25 or 0·5 with Cocaine Hydrochloride 2% (St. Th. H. 0·125 to 0·25). To be used with an equal quantity of water.

Ⓟ **Guttæ Zinci Chloridi cum Adrenalin, R.O.H.**

Zinc Chloride 0·25, Adrenalin Solution (1 in 1,000) 12, Chloretone 0·5, Sterilised Distilled Water to 100.

Ⓟ **Guttæ Zinci Chloridi (Aural) R.N.H.** Zinc Chloride 4 grains, Glycerin 2 drachms, Alcohol (90%) to 1 ounce.

Ⓟ **Liquor Zinci Chloridi** (*B.P.* '14). Sp. Gr. 1·530.

Four minims of this solution = 3 grains of solid Zinc Chloride. On diluting, a trace of hydrochloric acid will be necessary to clear it.

Uses.—A powerful odourless caustic, antiseptic, and anti-putrescent. The liquor is a strong deodorising antiseptic solution, it is *very poisonous.* Ten grains to the ounce of water may be used as a stimulant lotion to wounds and ulcers. Also used as **Paste** with Starch and Glycerin.

In the treatment of erosion of teeth is useful to touch painful spots, or the addition of a little to Chloroform-Mastich forms a useful paint.—Smale and Colyer.

Ⓟ **Lotio Zinci Chloridi, R.O.H.,** 0·12 or 0·25%.

For wounds Zinc Chloride solution 40 grains to the ounce was much favoured by Lord Lister. Prevents the occurrence of putrefaction in spite of access of septic material. Importance of free drainage.—G. T. Beatson, L. ii./15,1214.

Ⓟ **Injectio Zinci Chloridi, L.H.** for vaginal use.

Zinc Chloride 5 grains, Water to 1 pint, *i.e.* 0·06% or 1 in 1,600 in round numbers.

Zinci Citras. $[C_3H_4(OH).(COO)_3]_2Zn_3+2H_2O=610·252$.

Dose.—3 to 12 grains (**0·2 to 0·8 Gm**) White powder with metallic taste, not perfectly soluble in water. Has been used for epilepsy.

P1 **Zinci Cyanidum.** $Zn(CN)_2=117·396$.

An insoluble white powder with antiseptic properties.

Cf. **Mercuro-Zinc Cyanide.**

P1 **Zinci et Potassii Cyanidum.** $Zn(CN)_2.2KCN=247·604$.

Dose.—$\frac{1}{10}$ to 1 grain (**0·006 to 0·06 Gm.**).

A soluble cyanide, possessing the properties of hydrocyanic acid.

Zinci Iodidum. $ZnI_2=319·244$.

Average dose.—1 grain (**0·06 Gm.**).

A white deliquescent powder turning brown on exposure. For cerebral, spinal, and nervous diseases in the third stage of syphilis.

Zinci Lactas. $(C_2H_4.OH.COO)_2Zn,\ 3H_2O=297·538$.

Dose.—½ to 3 grains. (**0·03 to 0·2 Gm.**). Max. *pro die* 10 grains. (Has been used in France up to 3 Gm. for a dose!—Dorvault).

White crystals soluble 1 in 60 of water. In epilepsy.

Zinci Oxidum, Zinc Oxide. $ZnO=81·38$.

Dose.—3 to 10 grains (**0·2 to 0·65 Gm.**). **Tablets,** 2 grains.

Has been used for nervous debility, migraine, hysteria, *cf.* Zinc Acetate.

Mistura Zinci Oxidi E.L.

Zinc Oxide 1 grain, Glycerin 10 minims, Water to 1 drachm, for children.

Ⓟ **Mistura Zinci Oxidi cum Opio, E.L.** contains Tincture of Opium ½ minim in 1 drachm of the above.

Unguentum Zinci (*B.P.* '14). Zinc Oxide 15% in Benzoated Lard.

Unguentum Wilsoni. *Syn.* WILSON'S OINTMENT. P. JAP. IV.

Zinc Oxide 5, Benzoic Acid 1, Lard 30.

Unguentum Zinci Carbolisatum. Zinc Oxide 10, Phenol 2, Soft Paraffin 88. Dermatitis is well treated with this.

Unguentum Zinci cum Acido Salicylico.

Salicylic Acid 40 grains, Zinc Ointment 1 ounce, Soft Paraffin 1 ounce.

Petrolatum Zinci Oxidi. Zinc Oxide 1, White Vaseline 9. For surgical use starch is sometimes added, *cf.*, Pasta Zinci cum Amylo.

Linimentum Zinci Spissum, Zinc Liniment, P. Svec. X.

Zinc Oxide 200, Salicylic Acid 1, Adeps Lanæ 100, Olive Oil 300, Lime Water to 1000.

Cremor Zinci.

Zinc Oxide 3, White Vaseline 17, Perfume *q.s.*—For nursery use.

Cremor Zinci, St. M.'s H.

Dissolve Lanolin 3 in Olive Oil 8 by heat, sift Zinc Oxide 8 into the mixture and whip up with Lime Water 8. Useful in acute eczema (drying stage) where there is much redness.

Cremor Zinci et Calaminæ, V.H.C.

Prepared Calamine 1, Zinc Oxide 1, Lime Water 4, Almond Oil 4.

Gelatinum Zinci. Unna's Paste.

Gelatin 4, Water 16, soak 12 hours, then heat to dissolve, and add Zinc Oxide 6, previously rubbed down with Glycerin 12. For use it is melted and applied with a brush to eczematous surfaces. Ichthyol, Resorcin and other medicaments may be added.

Varicose Ulcers treated by the above after thoroughly cleansing the leg or foot with Soap and Spirit, Alcohol, Mercuric Chloride Solution 1 in 2000 to 1 in 4000, or 1 in 40 Carbolic Lotion. The Paste previously melted and cooled is poured over the ulcer, which has previously been disinfected with Hydrogen Peroxide or Mercuric Chloride or Carbolic Lotion. The part is then dried and the paste is bandaged on with a gauze bandage. Another layer of paste is applied; this is covered with a bandage, and so on until four layers have been applied. May be left in many cases undisturbed for weeks, but it is safer to dress again after two or three days with Salicylic Talc if any discharge. It forms a new skin pliable and slightly elastic.

A preparation of the composition Zinc Oxide 1, Gelatin 2, Glycerin 3, Water 4 parts, of value in arthritis, dermatitis, erysipelas, erythema nodosum and simplex, myositis, periostitis, phlebitis and varix of the leg, synovitis, 'tennis leg,' minor thrombosis, and contusions and sprains of joints of limbs. It is the treatment par excellence for chronic varix and acute phlebitis. Method of preparation and application of dressings.—W. Muir Smith, B.M.J., i./27,137.

Pasta Zinci cum Amylo, St. M.'s H.

Zinc Oxide, Starch, Soft Paraffin, Lanolin, of each equal parts. For intertrigo and disordered perspiration.

***Pellanthum** (T.M. 261943), containing 20% Zinc Oxide, is a special preparation and is cooling and soothing for irritable surfaces.

Compounds are Ichthyol, 3%, 5%, 10%; Ichthyol, 10%, with Resorcin 5%; Salicylic Acid 1% and 2%; Liquor Carbonis Detergens 10% and 15%; Huile de Cade 5%; Phenol 2% with Menthol 2%.

Lassar's Paste for Eczema. Zinc Oxide 24, Starch 24, Salicylic Acid 2, Yellow Soft Paraffin 50.=**Pasta Zinci Composita, U.C.H.**

Useful in chronic and acute eczema when weeping. In irritating conditions the acid may be omitted. It may be retained and increased in amount where there is less inflammatory reaction and where much scaling has occurred.

Pasta Carbonis et Zinci.

Soak Gelatin 16 in a portion of the total Glycerin required (20), and a portion of the water (50 in all required), for 12 hours. Make a paste of Boric Acid 6, Zinc Oxide 6, and Charcoal 18 with remainder of liquids, mix on water bath, and pour into suitable vessel to set.

For leg ulcers the Charcoal is a useful addition. Boric Lotion fomentation should first be carried out to clean the ulcer. If tending to be sluggish Red Lotion helps.

Ⓟ**Pilula Zinci cum Belladonna, T.H.**

Zinc Oxide 2 grains, Extract of Belladonna $\frac{1}{8}$ grain. *Dose.*—1 or 2.

Zinc Oxide, Starch, Boric Acid, and powdered **Orris Root,** and mixtures of these, are employed for the toilet.

Calamina Præparata B.P. 1885.

Syn. Lapis Calaminaris Præparatus.

Impure zinc oxide prepared by calcining native Calamine (zinc carbonate) and reducing it to an impalpable powder. Genuine Calamine is useful as a dusting powder, and for making lotions, and may be mixed with Carmine Triturate to produce the desired tint.

Linimentum Calaminæ, G.H.

Calamine 20 grains, Zinc Oxide 15 grains, Soft Soap 15 grains, Olive Oil 4 drachms, Water to 1 ounce.

Linimentum Calaminæ Compositum. U.C.H. is Prepared Calamine 9, Zinc Oxide 5, Zinc Oleo-Stearate 3, Wool Fat 3, Soft Paraffin 20, Liquid Paraffin to 100.

Lotio Calaminæ U.C.H., E.L.

Prepared Calamine 9, Zinc Oxide 5, Glycerin 3, Water to 100. Elutriate the calamine and zinc oxide by triturating them in a mortar with successive portions of the water and decanting from the siliceous matter, and add the glycerin. Used in eczema, especially where the surface is red and tender, also to conceal acne spots on the face. ⓅOne grain of mercuric chloride may be added to 6 ounces as antiseptic. Ⓟ**Lotio Calaminæ E.G.A.** (**Lotio pro Acne, N.H.W.**) is 20 grains each of Calamine and Zinc Oxide and 20 minims of Glycerin to the ounce of Water.

For chilblains on the hands this lotion and the following made double or treble strength allay the intense irritation.

In cutaneous affections, *e.g.*, of rheumatic origin a lotion of this kind is useful.—J. Galloway, Pr., Jan. '12,76.

Lotio Calaminæ Oleosa, St M.'s H., E.L.

Calamine 40 grains, Zinc Oxide 20 grains, Lime Water 3 drachms, Olive Oil 1 ounce (E.L. *to* 1 ounce).

In chronic eczema, *e.g.*, to a freely weeping surface with redness and itching apply with brush or cotton wool swab or spread on thin washed butter muslin. Very important that the inflamed surface should not be treated with a hot thick dressing. Perchloride 1 in 2,000 to 1 in 3,000 may be desirable addition.

Ⓟ**Unguentum Plumbi cum Calamina** 'Erysipelas Dressing,' **St. G. H.** Lead Plaster 18, Calamine 2, Olive Oil 9, Lard to 48.

Zinc Oxy-Phosphate is employed as a dental filling. It is supplied in the form of dried powdered zinc oxide in various colours, with the 'liquid,' which consists of phosphoric acid. These are mixed intimately prior to use as a flooring when not too near the pulp.

Zinc Oxy-Sulphate. Consists of calcined zinc sulphate and zinc oxide; mucilage of acacia is used to mass.

10 *grains (as much as lies on a sixpence) mixed quickly with at least* 5 *drops of the Fluid makes a good mass which sets as hard as stone.*

Fletcher's Artificial Dentine is similar.

Zinc Oxy-Chloride. The 'powder' is of zinc oxide and the 'liquid' zinc chloride solution. Mix thoroughly. Sometimes used as a root-filling and for sensitive dentine; will irritate a live pulp.

Zinci Salicylas. $Zn(C_6H_4.OH.COO)_2+3H_2O=393·508$.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

White crystals soluble in water 1 in 24, and in alcohol 1 in 2·5. As dusting powder and may be combined with gelatin (*v.* Gelatinum Zinci). Internally is used as a substitute for the Valerianate.

Zinci Sulphas (*B.P.* '14). $ZnSO_4.7H_2O$=287·556. *Dose.*—1 to 3 gr. **(0·06 to 0·2 Gm.)** tonic; 10 to 30 gr. **(0·6 to 2 Gm.)** emetic. Fr. Cx. Max. single and daily dose 15 grains.

Soluble 1 in 0·65 water at 59·5° F.—P.J. i./02,552.

Uses.—For gleet and gonorrhœa ½ to 1% injections are given, frequently combined with alum or sometimes Ferrous Sulphate.

Collyrium Adstringens Luteum. P. Austr. (1906). *Syn.* Guttæ Horsti. Horst's Eye Wash.

Ammonium Chloride 2, Zinc Sulphate 5, Distilled Water 890, dissolve and add Camphor 2, dissolved in diluted Spirit (Sp. Gr. 0·895) 100, then add Saffron 1. Digest 24 hours and filter. As an astringent lotion is used for conjunctivitis.

A Collyrium containing ½ grain of Zinc Sulphate and 10 grains Boric Acid per ounce preferable to organic Silver Compounds.—L. ii./11,1570.

Smarting of zinc or copper salts in collyria may be relieved by using a saturated solution of potassium chlorate instead of water.—B.M.J. i./26,928.

Meningococcus infections (carriers) cleared up by means of 1·2% solution in the 'Falmouth Steam Atomizer.'—B.M.J. ii /16,673.

Chlorosis can be rapidly cured by emetic of 20 grain doses for 6 to 8 days, in the morning fasting, of zinc sulphate. Iron sulphate (common) originally given by an old dame.—B.M.J. ii./08,1145.

Lotio Rubra U.C.H. Zinc Sulphate 0·5, Compound Tincture of Lavender 2·5, Water to 100. L.H. has Zinc Sulphate 2 grains, Fuchsin $\frac{1}{500}$ grain and Water to 1 ounce.

'Solubes' Zinci Sulphatis are equivalent to 2 and 10 ounces respectively of the above lotion.

'Solubes' Zinci Sulphatis et Aluminis contain 10 grains of each, for dissolving in a pint, more or less as required, of warm water.

'Collapsubes' of Zinc Sulphate 1 grain in 1 ounce of gelatin basis are for gleet and gonorrhœa.

Lotio Zinci Sulphatis. R.O.H. is Zinc Sulphate 0·25 or 0·5% in Distilled Water. Guttæ Zinci Sulphatis, 0·125, 0·25 or 0·5%.

Lotio Sulphatum.

Zinc Sulphate 30 to 40 grains, Alum 30 to 40 grains, Ferrous Sulphate 20 grains, Copper Sulphate 2 grains, Water 8 ounces.

Ophthalmic Discs of $\frac{1}{250}$ grain **Zinc Sulphate** and $\boxed{\text{P1}}$ **Zinc Sulphate** $\frac{1}{250}$ grain with **Atropine** $\frac{1}{5000}$ grain are made.

Points of Zinc Sulphate are moulded for intra-uterine use. **Points** of equal parts **Zinc Sulphate** and **Alum,** and of **Copper Sulphate** are also made.

Injectio Zinci Sulphatis L.H. for vaginal use.

Has 60 grains in 1 pint of water, *i.e.* 0·69% or 1 in 144·9.

Lotio Alba (McKenna).

Zinc Sulphate and Sulphurated Potash of each 1½ drachms, Water to 4 ounces.

Acne vulgaris is well treated with this—*cf.* J. F. Christie, B.M.J i./27,1032.

SUPPLEMENTARY LIST OF DRUGS.

Abrus Precatorius (*Leguminosæ*) Jequirity Seeds, Prayer Beads, Jumble-Beads, Indian Licorice of scarlet colour, contain abrin, a poisonous principle.

Instillation of 5% infusion of crushed Seeds for relief of pannus.—Lieut. Col. H. Kirkpatrick, L. i./21,1304; see also Trachoma, Therap. Index.

Artificially produced ophthalmia by means of jequirity, croton or castor oil seeds in Mesopotamian Expeditionary Force. Eye inflammation caused accidentally with Emetine. Recovery in 10 days with fomentations and use of Atropine.—G. McPherson, per T.D.B. 18/21,85.

Jequritol (Guttæ R.O.H.) is a glycerinated solution to produce artificial inflammation in eye affections.

Absinthium *Syn.* Wormwood. Dried leaves and tops of Artemisia Absinthium L., *N.O. Compositœ.* The active ingredient is the oil (1%). Its use is tonic and digestive. Infusion 1 in 20. *Dose.*—1 to 2 ounces. The oil is contained in the drink Absinthe. Other essential oils, *e.g.*, anise, coriander, fennel, peppermint, hyssop, angelica and melissa are stated to be additional constituents.

Vermouth causes fits, probably due to Thujone from Wormwood and Tansy. —B.M.J. ii/25,39

Acaciæ Cortex (*B.P.* '14). *A. arabica* and *A. decurrens.* Dried bark kept for one year. **Decoctum** (*B.P.* '14). *Dose.*—½ to 2 oz. 6% in water. Astringent, suitable as gargle or lotion = Oak Bark.—Ec. Prod. I. i. 21. Pg. I. i. 550,556.

Acetonum (*B.P.* '14). U.S., P. JAP. IV. *Syn. Dimethyl-Ketone.* CH_3CO, $CH_3 = 58{\cdot}048$. *Dose.*—60 to 90 minims (**4 to 6 Cc.**) daily. A colourless, light, inflammable, neutral liquid, with ethereal odour and camphoraceous taste, contained in crude wood spirit, obtained by the dry distillation of acetates. It is miscible with water, alcohol, ether, chloroform, and oils, and is a ready solvent of fats and resins, pyroxylin, celluloid and many other organic substances. It takes up about 25 times its volume of acetylene. If pure, its Sp. Gr. is 0·795 to 0·8. B. Pt. 56·5° C. It is largely employed in the manufacture of chloroform.

It occurs in small quantity as a normal constituent in the urine, also (frequently in large amount) in that of diabetics, *cf. Vol. II.*

We have determined its *Antiseptic Power* using *B. Coli Communis* as test organism.—See Chapter on Antiseptics, Vol. II.

Pharmacology.—It is particularly potent when a number of just active doses are given; inhibits respiration and heat and produces fall of blood pressure.—J.C.S.A. i./1922,794.

Acetone Bacillus. Fermentation of Starch under aseptic precautions and the separation of the two main liquid products Butyl Alcohol and Acetone by fractionation. A use is wanted for Butyl Alcohol in peace time.—B.M.J. i./22,115.

Acetone has been used in dyspnœa. It has also been given as an anthelmintic, and used for cleansing the skin prior to operation.

Inoperable cancer of the uterus has been treated by Acetone, the idea being to harden the surface of the cancer so checking the discharge until the escharotic portion is cast off. The free surface can then be again treated. From ½ to 1 ounce is used at a time, being poured into the wound through a Ferguson's Speculum. It is well to coat the vulva and vagina with a layer of soft paraffin. After the treatment with acetone the speculum is withdrawn, the cavity swabbed out and packed for 4 hours with a tampon coated with soft paraffin. —Refs. in XVIIIth Edn.

Iodo-Acetone.—Iodine 2% in Acetone is used to sterilise catgut. First steep in ligroin to free from fat.—*Vide* also Iodised gut.

Acetophenone. *Syn.* **Hypnone.** $C_6H_5CO.CH_3 = 120{\cdot}039$.

Dose.—1½ to 5 minims (**0·1 to 0·3 Cc.**) in almond emulsion, or with mucilage or syrup and peppermint water, or in **Capsules** containing ¾ minim. A colourless liquid, with odour of Bitter Almonds. Insoluble in water, but soluble in alcohol and oils. Used as an hypnotic requires care

Acidum Chromicum. *Syn.* **Chromic Anhydride.**—(*B.P.* '14), P.G. VI. $CrO_3 = 100{\cdot}01$.

Manufacture.—To obtain pure crystals, mix 300 Potassium Bichromate with Water 500 and add Sulphuric Acid (Conc.) 420 (by vol.). Allow mixture to stand 12 hours. Acid Potassium Sulphate crystallises out which remove. Heat the mother liquor to 80 to 90° C. and add Sulphuric Acid 150 (by vol.), also Water, *q.s.*, to dissolve the chromic anhydride crystals which at first throw out. After standing 12 hours decant the liquid from the crystals that have separated and concentrate to obtain further yield. Drain on a porous plate and wash with Nitric Acid, Sp. Gr. 1·46, and dry in a current of warm air.—U.S.D. In deliquescent, crimson crystals. A powerful oxidising agent. ***Caution : Incompatible*** with alcohol, glycerin, and other oxidisable substances. ***Soluble*** about 5 in 3 of water.

Liquor (*B.P.* '14).—25% *w/v* in water. Aqueous solution 1 in 4, or stronger —is applied to warts on genitals, to condylomata and lupus ; and 1 in 40 to ulcerated gums and mouth sores. For sweating feet 5 to 10% Lotion ; in leucorrhœa and ozæna 1 in 2,000. In secondary syphilis of the pharynx the so-called snail-track ulcer treated with a solution (10 grains to the ounce).—B.M.J. ii./09,197. For mucous and warty patches 5% is useful.

Ulcerative stomatitis. The organisms concerned are obligatory anaerobes. Chromic Acid relieves pain and removes the necrotic tissue best. Used warm 1 in 200 to 1 in 400 and applied with wool round a probe. Immediately after the use of the chromic lotion paint the affected area with a mixture of 20 grains of Chloretone to the ounce of equal parts gycerin and spirit. Cocaine 10 grains and Salol 30 grains to the ounce may be used if Chloretone is not available. *B. fusiformis* Vaccine successful in the acute stages.—Sir K. Goadby, L. i./16,959.

Rodent ulcer treated by Chromic Acid solution, 10% strength, applied with a brush daily with alternately Boric Acid and Zinc ointment. At first the ulcer may actually increase in size. It is less drastic than Arsenic and does not affect healthy tissue cells.—A. Dingwall Kennedy, B.M.J. ii./22,844.

Acidum Gallicum. $C_6H_2(OH)_3COOH + H_2O = 188.064$.

Dose.—5 to 15 grains. Crystals or crystalline powder of brownish colour. Soluble in water about 1 in 100, in glycerin 1 in 12, in alcohol 90% 1 in 5. Properties and uses similar to Tannic Acid, *q.v.*

Acidum Hydrofluoricum HF = 20·008 *Syn.* **Fluoric Acid** of commerce redistilled for medicinal use. Manufactured by the action of Sulphuric Acid on Fluor Spar (CaF_2) in lead or platinum vessels. It contains about 30% of the gas, emits suffocating fumes, and requires to be kept in gutta-percha or leaden bottles.

Bad burns may be produced in a delayed manner. Swelling of thumb and finger consequent on handling a cracked gutta-percha bottle of the acid. The skin became distended to bursting point with intense pain. Blisters were punctured. 1% Phenol compresses and later Normal Saline. Sodium Bicarbonate bath or preferably Ammonium Carbonate suggested as best treatment.—F. C. C. Robb, P.J. i./20,560.

Acidum Hydrofluoricum Dilutum, B.P.C. *Dose.*—5 to 15 minims.

Contains 0·2%. Even thus diluted should not be kept in glass bottles for use. Has been given for goitre.

Ammonii Fluoridum NH_4F = 37·04. *Dose.*—4 grains may be considered more than a maximum.—W.H.M. (an experiment on himself for Sir Wm. Gowers). This salt (soluble 5 in 6 of water) has been suggested to diminish enlarged spleen and in goitre in doses of 5 to 20 minims of solution, 4 grains in an ounce, after meals (supply in a gutta-percha bottle). For phthisis inhalation from a 1 in 500 solution has been recommended.

Incompatible with Nitric Acid, Quinine Salts, Spirit of Nitrous Ether and soluble Calcium Salts, but compatible with Tinctura Ferri Perchloridi. **Calcii Fluoridum.** CaF_2 = 78·07. *Dose.*—$\frac{1}{4}$ to $\frac{1}{2}$ grain suitably diluted. White powder insoluble in water, has been advocated for improvement of the teeth and building up bone. A work of reference says solubility in water is increased by Ammonium Salts. We found this absolutely unsubstantiated by experiments with Ammonium Chloride, Phosphate and Nitrate. **Ferri Fluoridum. Ferric with Ferrous Fluoride** *Dose.*—$\frac{1}{20}$ to $\frac{1}{2}$ grain. A purplish grey insoluble powder, possessing hæmatinic properties has been used for enlarged spleen. **Quininæ Fluoridum.** $C_{20}H_{24}N_2O_2$, HF = 344·216. *Dose.*—$\frac{1}{20}$ to $\frac{1}{2}$ grain. In relieving enlarged spleen and in rickets. **Sodii Fluoridum.** NaF = 41·997. *Dose.*—$\frac{1}{20}$ to $\frac{1}{2}$ grain. Antiseptic in phthisis. Active against *Staphylo* and *Streptococci* and *B. pyocyaneus* and fairly so against *B. aerogenes capsulatus*—*cf.* 'Specificity in Antiseptics,' *Vol. II.*

Acidum Iodicum. HIO_3 = 175·940. *Dose.*—1 to 5 grains.

White crystalline powder very soluble in water. Iodic acid is a remarkable deodorant and preservative even in a 1 in 2,500 solution. It is employed in ozæna, for deodorising offensive urine, as an irrigant in empyema (strength 1 in 500) and for leg ulcers, as a mouth wash, *e.g.*, in inoperable epithelioma, and as a throat swabbing in diphtheria. Found useful in extensive burning (1 in 500 solution). Internally a drachm of a 1 in 100 solution, well diluted, has been given in gastro-intestinal sepsis, as in typhoid fever. The calcium salt is principally employed.

Calcii Iodas. $Ca\ (IO_3)_2,\ 6H_2O = 498{\cdot}030$. *Syn.* **Calcinol.**

Dose.—3 to 4 grains three times daily in solution.

Tasteless, odourless powder, soluble in 380 parts of water at 11·5° C. Acts equally well in an acid or alkaline medium as a deodorant and anti-putrefactive. A useful dusting powder. **Lotio Calcii Iodatis** (saturated aqueous solution) is employed in septic and suppurating wounds, and a **Gauze** (3% strength) may be used for the same purpose. Healing ensues with the production of a dry scab. A warm saturated solution is used as a **vaginal douche** or bladder irrigant; efficient as a mouth wash or gargle. Should prove useful in pyorrhœa alveolaris. An **ointment** 2% thought specific in eczema. A solution or a 10% insufflation with bismuth carbonate may be useful in otorrhœa. May prove of value in fœtid breath. **Hypodermic injections** of from ½ to 2 drachms of an emulsion of 3 drachms of the Iodate in 1 ounce of glycerin in tuberculous joints.

Hydrargyri Iodas, $Hg\ (IO_3)_2 = 550{\cdot}474$. *Dose.*—⅙ to ⅓ grain.

A white powder, strongly antiseptic. *Soluble* with the addition of Sodium Chloride to the extent of 2% in water. Potassium Iodide also assists solubility. It attacks disease organisms with both its component ions, and contains only half as much Mercury as the Perchloride. In a pronounced sycosis of hairy parts of the face an ointment containing 4% effectual.

Bismuthi Subiodas.—Insoluble in water. In lupus as dusting powder and ointment (4%), and in scrofulous glands as a dusting powder.

Sodii Iodas, $NaIO_3 = 197{\cdot}929$. 1½ grains in 5% solution (about saturated) have been injected for acute and chronic articular rheumatism. **Zinci Iodas,** —$Zn(IO_3)_2 = 415{\cdot}244$. White powder.

Soluble about 1 in 50. Use similar to the calcium salt.

Acidum Malicum. *Syn.* **Hydroxysuccinic Acid.** $C_2H_3(OH)(COOH)_2 = 134{\cdot}028$. *Dose.*—1 to 5 grains. White deliquescent crystals soluble in water 1 in 1, and in Alcohol 1 in 1½. Has been used as throat spray in diphtheria, and other throat affections. Possesses properties similar to Tartaric Acid in a modified form. It is chemically allied to Succinic Acid. In phthisis much larger doses—up to 2 drachms have been given.

As an antiseptic, found to be specific against the gas bacillus (***B. aerogenes capsulatus***).

Acidum Meconicum. $C_7H_4O_7,3H_2O = 254{\cdot}08$. White crystals slightly soluble in water. Forms soluble salts with Opium Alkaloids. It occurs in good opium to extent of 5 to 8%. Has little or no physiological action. Salts are of variable composition.—P.J. ii./05,548.

For method of assay of the Acid in the drug *vide* P. Van der Wielen.—P.J. ii./13,114. *cf.* also Vol. ii.

As Meconic Acid readily forms a tri-sodium compound it was for long regarded as a tribasic acid. It contains, however, only two COOH groups and an additional OH enables it to form tri-compounds with stronger bases. With alkaloids it only forms dibasic or monobasic salts. Although in boiling water it evolves CO_2 and becomes slowly converted into Comenic Acid, it may be dried on the water bath to constant weight losing only its water of hydration.—D. B. Dott, P.J. i./21,232.

Acidum Osmicum. $OsO_4 = 254{\cdot}8$.

Syn. OSMIUM TETROXIDE, HYPEROSMIC ACID. *Dose.*—$\frac{1}{64}$ to $\frac{1}{10}$ grain.

In waxlike yellow crystals. Its vapour is intolerably pungent. Soluble slowly about 1 in 50 of water. It is poisonous and a powerful oxidizing body. It is used in microscopy; fat and medullary matter are blackened by it.

This and **Potassium Osmate** 1% solution in 2 to 10 minim doses have been injected hypodermically (painful) for neuralgia, for strumous glands, goitrous swellings, sarcoma, and cancer; also sciatica and muscular rheumatism, and given internally in epilepsy.

Liquor Acidi Chromo-Aceto-Osmici (Flemming's Strong Solution). Mix Glacial Acetic Acid 100 with Osmic Acid 8 in water 400, and Chromic Acid 15 in water 1,500. Cancerous growths have been treated: 8 Cc. injections at edge of tumour, or 1 Cc. just beneath its surface. Also for fixing, in histology.

Acidum Succinicum.—$C_2H_4.COOH.COOH = 118·048$. *Dose.*—5 to 10 grains (0·3 to 0·6 Gm.).

Occurs on destructive distillation of Amber, as the oxidation product of a number of substances rich in carbon, *e.g.*, fats and fatty acids—treated with Nitric Acid. Also by fermentation of Malic Acid (Calcium Salt)—Liebig, or of Tartaric Acid, which is Dihydroxy-Succinic Acid.

Colourless crystals *Soluble* in Water 1 in 20, in Alcohol 1 in 9. **Ammonii Succinas.**—$C_2H_4(COONH_4)_2 = 152·112$. *Dose.*—2 to 5 grains. Crystalline salt soluble in water and alcohol. In spasmodic pains, particularly spastic contractions of the uterus. **Sodii Succinas.**—$C_2H_4(COONa)_3 + 6H_2O = 270·125$. *Dose* 2 to 5 grains in catarrhal jaundice. Soluble 1 in less than 1·5 water. Has also been given in delirium tremens.—M.Am.

Potassii Succinas. C_3H_1 $(COOK)_2 + 3H_2O = 248·272$. A deliquescent powder; has been used in doses of 5 to 10 grains to control hæmorrhage. **Ferri Succinas.** Ferric Succinate, a reddish-brown insoluble powder, removes biliary calculi and relieves hepatic colic.

Acocanthera. *Syn.* TOXICOPHLŒA. Hottentot's Poison Bush. *A. Venenata* is employed in South Africa, here referred to. Probably contains Ouabain or allied glucoside. **Extractum Liquidum** (1=1) from the leaves. *Suggested dose* 2½ to 7½ minims, a substitute for digitalis.

F1 Aconitum **Laciniatum** is the probable source of Nepaul Aconite. *Syn.* *Bish* or *Bikh.*

F1 Tincture 1 in 8 of 90% alcohol. *Dose*, 1 minim hourly.

Adeps Præparatus *B.P.* '14.—*Syn.* ADEPS SUILLUS, AXUNGIA, **Ph. Ned. V., Adeps Lotus P. Dan.**

The purified fat of the hog, *Sus scrofa* (Linn.)—from the 'flare' or 'omentum' contains 60% triolein (sold when separated by freezing and pressure as 'Lard Oil'), *v.* Sapones, *Vol. II.* The remainder is palmitin and stearin. *Soluble* in ether 1 in 22, hardly soluble in alcohol. **Adeps Induratus** is for use in the tropics. The liquid constituent is removed to a great extent by pressure. **Adeps Benzoatus** (*B.P.* '14) is made with 3% Benzoin. To be avoided as a basis for eye ointments.

Adonis vernalis (P. Austr., Ph. Ned. V.).—Contains a hygroscopic glucoside Adonidin which resembles Digitalis in action. *Dose*—in powder, 3 to 6 grains; of infusion 1 in 40, 4 drachms; of Adonidin, ¼ to ½ grain. daily. Epilepsy has been treated with it combined with Bromide. **Tincture.**—Leaves and Stalks employed 1 in 10.—*Dose*, 10 to 30 minims. Adonidin is a local anæsthetic. In chronic glaucoma, iritis, and irito-cystitis 1% solution has been used, 3 drops relieve pain.

Five mgr. of **Adonidin** in 0·5% solution an efficient diuretic in cardiac anasarca.—per Y.B.P., '27,218. See also **Y.B.P. '26,237.**

Adonite, a sugar ($C_5H_7(OH)_5$), occurs in the plant. The crystals have sweet taste, are very soluble in water, less in spirit. M. Pt. 102° C. It is employed as a Bacteriological Sugar in fermentation reactions—*cf.* Vol. II., B. Typhosus.

Æsculus Hippocastanum.—Horse-Chestnut. Marron d'Inde FR. CX. NOUV. SUPP. 26. Tincture of Seeds 1 in 10 proof spirit has been given for painful hæmorrhoids. *Dose.*—10 minims night and morning. Also emmenagogue. A liquid extract has been used, painted on or rubbed in, in rheumatism and neuralgia. **Kastanol.**—Extractum Hippocastani Liquidum with 8% camphor; used in rheumatism.—(Austria.) Ph. Notes.

Chestnuts contain from 21 to 47% of Starch and Acorns from 55 to 57%, the total sugar in addition being 11 to 19 and 6 to 9% respectively. On hydrolysis with acids about 30 gallons of absolute alcohol could be obtained from a ton of nuts.—L. ii./17,757.

Æsculin, $C_{15}H_{16}O_9.1\frac{1}{2}H_2O = 367·152$, a glucoside, soluble in water, to which 2 to 3% Sodium Carbonate is added, also soluble in alcohol. Solutions have a blue fluorescence, and have been used similarly to Quinine in X-ray and Finsen light treatment (*q.v.*). *Dose.*—1 to 5 minims of 5% solution.

An ointment containing Æsculin used for prevention of sunburn.—Pres., July, '26,285. We have prepared an ointment 2% strength in yellow paraffin which has been tested by ultra violet light and found to be effectual. Other bases, *e.g.* soaps, etc., not satisfactory.

Aqua Zeozoni is the name applied to a 0·3 to 0·5% solution of a derivative of Æsculin neutralised with Boric Acid. Applied to the eye it is said to absorb such ultra-violet rays of light as have a wave-length of between 300 and 400. Suggested to take the place of veils, umbrellas, *e.g.*, in blinding snow light.

Alcoolature Stabilisée suggested by the late Professor Bourquelot—*cf.* Valerian. In the case of horse chestnuts, Alcohol of 75% strength is employed for stabilisation and extraction.—C. D. Aug. 5122, p. 208. See also our note under Valerian.

Æthusa Cynapium.—Fool's Parsley, Lesser Hemlock. Contains a small amount of volatile alkaloid, with the properties of Conine; calculated as hydrochloride constitutes 0·0003% of the entire fresh herb. A larger proportion under favourable conditions, may be produced leading to poisonous properties. It also contains a volatile oil, 0·015% of the entire fresh plant and resin 0·8%. Has narcotic properties. Garden Parsley, *vide* Apiol.

Æthyl Bromidum. P.G. VI., FR. CX., P. JAP., P. HELV. C_2H_5Br. *Syn.* HYDROBROMIC ETHER.

A colourless, very volatile liquid with a strong peculiar odour and a sweetish warm taste, becoming brown by exposure owing to decomposition, bromine being split off. It has Sp. Gr. 1·4735 and boils at 38·8° C. P.G. dilutes with spirit to improve keeping properties. *Soluble* 1 in 85 of water and miscible with alcohol 90% and ether.

For *local* anæsthesia it may be used as spray, or simply short covered contact for neuralgia. It may be added to Menthol Liniment. Somnoform (*q.v.*) contains 5%. **Ethyl Bromide Sterules.** Encased in cotton wool and rayon, contain 5 minims in each; are convenient for use when crushed. Useful in asthma and epileptic convulsions.

Ethylene Bromide.—$C_2H_4Br_2 = 187{\cdot}864$. *This is poisonous—distinguish from the above.* *Dose.*—1 to 2 minims in alcoholic solution or oily solution hypodermically or in **Gelatin Capsules.** A colourless liquid, of Sp. Gr. 2·163, soluble 1 in 4 of 90% alcohol, insoluble in water. Reduces frequency and intensity of attacks in epilepsy.

Agar-Agar—Japanese Isinglass. P.G. VI., U.S. X., P. Svec. X., P. Jap IV. Membrane-like strips, consisting of the dried jelly of *Gelidium corneum* a sea-weed and other species. 1 in boiling water 200 forms on cooling a transparent jelly, suitable for invalids. It has little nutritive value—it is not digested—but is useful for treating constipation, especially of the type where the stools are hard and dry owing to complete absorption of liquid from the digestive tract. For this purpose it is best crushed into small pieces like bran—termed **Flaked Agar.** Clinical experience shows that finely powdered or even sand-like powder is not efficacious. Teaspoonful doses occasionally of the dry substance in flake form sprinkled in little moist food, *e.g.*, stewed apples, act as mild aperient in that it softens the fæces, but should be employed at first in moderation, as it may possibly cause obstruction. By taking up moisture it increases the volume of the fæces and promotes peristalsis.—*See* Cascara Jelly, also. It is used in preparation of culture media for bacteria (*q.v.*); also for finishing calicos, silks, &c.

It has been suggested in the case of young children to cook the flakes with cereal food or soup. Considerable boiling is required before it becomes homogeneous. Children of 4—5 years need as a rule about 1 drachm, but this method to us would not appear so effectual.

Production of Agar.—P.J. ii./26,372.

Agar-Agar—detection and estimation.—J. King, Analyst, 1925.

Vanilla, Almond and **Raspberry** flavored **Flaked Agar** are prepared.

Linseed appears to act, as regards weight yield of fæces, better than Agar-Agar.—88% increase against 48%, but not so well as Psyllium, 97%. Did not depend on humidity.—B.M.J.E. i./14,59.

✱Thaolaxine (T.M. 319983), described as Agar-Agar with Rhamnaceous Extracts, in form of Scales, Cachets, Tablets and Granules. A laxative in treatment of chronic constipation.

✱Jubol (T.M. 313263). Tablets of Agar-Agar with biliary and intestinal glands extract. *Dose.*—3 tablets at bedtime.—Gebe.

Paraffagar and other preparations with liquid paraffin are prepared, *q.v.*

Agaricus Albus.—*Syn.* Polyporus Officinalis, Boletus Laricis, Fungus Laricis (P. Austr.), **Polypore de Melese** (FR. CX.). Purging Agaric. *Dose.*—10 to 30 grains. Light, spongy pieces. Large doses purgative, small ones astringent for night sweats, diarrhœa and to diminish bronchial secretion. Tincture 1 in 10 of 60% alcohol. *Dose.*—20 to 60 minims. EXTRACT—*Dose.*—½ to 2 grains. Prepared by exhaustion with 60% Alcohol, yield is about 6%.

Not to be confused with the fly agaric, Amanita Muscaria, which contains [P1] **Muscarine** and Synthetic Muscarine or Choline Nitrous Ether. See Edn. XVIII, p. 808.

Acidum Agaricum. Agaricin P.G. VI., Ital. Helv. and Jap. and Dan. $CH_2C(OH)(CH)(C_{16}H_{33})(COOH)_3 1\frac{1}{2}H_2O$. *Syn.* Laricic Acid. *Dose.*—⅙ to ½ grain is given to restrain the sweating of phthisis. Max. Single dose (P.G. VI. and Ital.) 1½ grains.

Agrimonia Eupatoria (*Rosaceæ*).—Common agrimony. Mild astringent.

Elixir Agrimoniæ Compositum (Lunan). A special preparation of agrimony, rhubarb, toad-flax (*Antirrhinum Linaria*), barberry, caraway, chamomile, dandelion, parsley, is in demand in incipient appendicitis; stated to avert an operation, and in any condition of the stomach and alimentary canal likely to produce inflammatory symptoms. *Dose.*—1 drachm in water thrice daily; as hepatic stimulant: mild astringent. **Mistura Agrimoniæ Composita**. *Dose.*—½ ounce thrice daily, is of similar composition for gallstones, and to prevent their formation—stated to prove effectual. CAPSULES are also made.

Agropyrum, Triticum (*B.P.* '14) or COUCH GRASS. Dried rhizome of *A. repens* (*Triticum repens*). Contains triticin, a carbohydrate similar to inulin. Useful in gonorrhœa. Diuretic and aperient.—Pg. I. iii. 50. **Decoctum** (*B.P.* '14). *Dose.*—½ to 2 oz. Prepared with Water, 1 in 20. **Ext. Liq.** (*B.P.* '14). *Dose.*—1 to 2 dr. Made 1 = 1 with boiling water, and 25% of alc. 90%. *Flavouring.*—Syl Lavandulæ; Aqua Anethi.

Triticum Repens (genuine) is a commercial rarity. The chief, if not the only substitute is the rhizome of *Cynodon Dactylon*, the dog grass. Spain is apparently the geographical source of the material of commerce.—J. Small B.P. Conf.. 1919.

Alchemilla Arvensis (*Rosaceæ*). Parsley Piert. Small annual plants with green flowers. Is superior to buchu in some instances. Infusion of leaves 1 in 10. *Dose.*—1 to 2 ounces.

Aletris Farinosa, B.P.C.—Star Grass (Colic Root). From the rhizome of this are prepared a fluid Extract with diluted alcohol, U.S. (1890, 1 = 1) *dose*, 5 to 15 minims, and a Cordial or Elixir (B.P.C. containing Liquid Extract of Aletris 25, Liquid Extract of Liquorice 6, Simple Elixir 45, Water to 100). *Dose.*—½ to 1 drachm, are used as uterine tonics. **Extractum Aletridis Liquidum, B.P.C.** 1 = 1 by percolation with Alcohol 45%.

Alginoid Iron. *Syn.* ✱ALGIRON (T.M. 283697).—*Dose*, 2 to 15 grains. Alginic Acid from seaweed is combined with iron, forming an insoluble brown powder containing about 11% of iron. Does not constipate: is given for anæmia. Pills and pellets are prepared. Also compound pills. Algiron 2 gr. with Extract Cascara ⅛ gr.; with [P1]Cascara Extract ¼ and Nux Vomica Extract ⅛ gr. (total wt. 3 grains); [P1]Arsenic $\frac{1}{100}$ grain; [P1] with Arsenic $\frac{1}{100}$ grain and Strychnine $\frac{1}{100}$ grain; Ⓟwith Quinine 1 grain and Strychnine $\frac{1}{150}$ grain; and Ⓟwith Nux Vomica Extract ⅛ grain and Zinc Valerianate 1 grain. **Cupri Alginas.** *Dose.*—$\frac{1}{24}$ to ⅙ grain. A green powder. Used in lupus, leprosy, cancer and anæmia.—B.M.J. i./06, 1464.

Allium Sativum.—Garlic bulb (*Liliaceæ*). *Dose.*—½ to 2 drachms. Garlic preparations have been given in pulmonary phthisis and bronchiectasis. They are useful in cases of dilated bronchi with fetid expectoration. **Succus.** *Dose.*—10 to 30 minims. **Extract** = inspissated juice. *Dose.*—4 to 10 grains. Pill contains 4 grains extract.

Oleum Allii Essentiale.—This Oil is excreted through the lungs and skin—not apparently by the kidney. Its principal constituent is usually taken to be Allyl Sulphide $(C_3H_5)_2S = 114{\cdot}15$. Stimulant, expectorant and stomachic. In chronic bronchitis, pneumonia, also in cholera and tuberculosis, Allyl Sulphide can be made by interaction of Alcoholic Potassium Sulphide with Allyl Iodide. *Dose* of either the Natural Oil or Allyl Sulphide, ½ to 2 minims, in **Capsules**, ½ minim of Allyl Sulphide per kilo body weight may be taken as lethal dose.

Laryngeal tuberculosis treated by ½ to 1 drachm, two or three times a day, of the Garlic Juice with Tinct. Lavand. Co. and Syrup. Simplex, also gargle or spray (or combined), or for internal use, accompanied by poultice (or blister) of pulped garlic externally—latter also to tuberculous ulcers. Fresh juice is not so severe in action as the pulped garlic. The juice should never be applied to broken surfaces. Lengthy application of poultices (3 to 4 weeks with changes) may be required, but effect should first be tried for a few hours, as some are more susceptible than others. It was held by W. C. Minchin, who advocated the treatment, that Allyl Sulphide is specific in all tuberculous lesions in accessible situations, or in those which can be rendered accessible. Thus every case of tuberculous disease in the leg, foot, arm, hand, testicle, etc., gets well under Allyl Sulphide treatment. Allyl Sulphide certainly has fairly high germicidal power, *cf.* Vol. II, *Carbolic Coefficients.*

The following were finally adopted as modes of treatment:—

Emplastrum Allii.—Fresh garlic *q.s.*, pulped, 2 lbs., to this add ½ lb. lard warmed to a cream, and mix thoroughly. Spread on thin butter-muslin and apply to the part, changing the dressing about every 24 hours.

Unguentum Allyl Sulphidi, 0·1%—increased in strength if desired—in Oleum Anseri Benzoatus, could replace above as being more expeditious to prepare.

Inhalation.—Fresh Garlic Juice 56, Alcohol (90%) 7, Eucalyptus Oil (*var.* Citriodora) (Bayard) 1. 4 ounces is sufficient for three weeks' treatment of pulmonary tuberculosis. The juice is *fresh* and *not filtered.* Patient to use inhaler at least 1 hour night and morning. **Capsules of Allyl Sulphide,** 2 minims, can be used in addition if practicable.

The Inhalant is used in a respirator (Minchin's). In a case described the quality of sputum improved in a week, cough became useful and less wearisome.

For lupus apply the fresh juice at night and allow to dry, wash off in morning and apply a bland ointment.

Suppuration of wounds controlled by Succus Allii diluted with 3 or 4 parts Distilled Water. Notable improvement in 48 hours. A case of empyema remarkably cleaned out with this lotion. Stronger than this (1 with 2 of water) caused pain. Later 1 with 9 of water used when suppuration definitely controlled.—V. Gabriel, L. ii./15 603.

Whooping Cough has been treated by Garlic juice *per os.*—T. Mark Hovell, B.M.J. ii./16,15; i./17,284.

Duodenal ulcers have been successfully treated by rectal injection of the juice diluted with three times quantity of water.

Hydrarthrosis has been cured by placing the fleshy scales of the onion round the joint and keeping in place with a bandage.

Gangrene of the lung treated by 20% Garlic Tincture.—Pr. June 22/443.

Allylene (Zambeletti). A preparation for intramuscular injection, and in pill form, in phthisis; also combined with Tuberculin.

Allium Cepa, the ordinary onion, is of less strength than Allium Sativum.—P.J. i./20,345.

Allium Porrium.—The common leek also contains Allyl Sulphide.

Alnus Glutinosa.—The common Alder. *Uses.*—Astringent and tonic. Contains about 20% of Tannin. *Liquid Extract* 1 = 1 of the bark. *Dose.*—10 to 30 minims. Made by percolation with 45% Alcohol. Set aside the first portion, percolating (¾ of the whole), and continue percolation with remainder of the Alcohol, concentrate and add to reserve portion. Was advocated in cancer. A Liquid Extract of the leaves, prepared by boiling with water and adding Alcohol *q.s.* to preserve, has also been used. In 140 cases of cancer, pain, cachexia, and exhaustion diminished.

Alstonia constricta, *B.P.* '14.—Bark used in Australia as a febrifuge, *Dose,* in powder, 5 grains. A crystalline alkaloid, Alstonine or Chlorogenine. $C_{21}H_{20}N_2O_4,3\frac{1}{2}H_2O = 427{\cdot}232$, has been isolated from it, Tincture, 1 in 8 Alcohol 60%. *Dose.*—½ to 1 drachm. Should be less, 5 to 20 minims. Influenza has been treated by Tincture in 10 minim doses. Three other alkaloids exist in it. A mild diaphoretic. When prescribing the tincture that of *A. constricta* should be specified.

Alstonia scholaris. *B.P.* '14.—Dita bark, from India and the Philippines, contains amongst others an alkaloid, Ditaine, *syn.* Echitamine, $C_{22}H_{28}N_2O_4$ and the milky juice of the tree forms a substance resembling gutta-percha. Tincture, 1 in 8 Alcohol 60%. *Dose.*—¼ to 1 drachm.—These two drugs are under one monograph. **Infusion**—1 in 20 boiling water. Tonic in malaria, in chronic diarrhœa and advanced stages of dysentery.

Althæa. Marshmallow, dried root of *Althœa officinalis* (*Malvaceæ*) from second year's growth and deprived of the periderm. Contains Asparagin, *q.v.* Is mucilaginous and used in pill making to give 'body.'

Amadou.—Oak agaric, Surgeons' agaric, Touchwood. *Polyporus fomentarius* L. A fungus prepared with alkali and nitre, in light brown elastic pieces employed as a mechanical hæmostatic. It is included in P. Austr. under the name *Fungus igniarius.*

Ambergris. A substance found floating on the surface of the sea—in southern hemisphere, valued for its perfume which is generated on keeping in a closed receptacle for a year or so, generally believed to be an intestinal product from the sperm whale.

A sample, 'possibly genuine,' had M. pt. 75° C. with a small amount of substance which did not melt at 100° C. It was of grey colour with little odour. It was soluble to extent of 93·8% in Petroleum Ether which extract had Ref. Index (70°) 1·495, Iodine No. 107·1, Acid value 1, Sap. No. 4·4; this portion presumably containing the Ambrein was soluble in absolute Alcohol on warming and melted to a clear sticky amber liquid at 42° C.—all of which figures are scarcely those of the adulterant ozokerite.—Evans' Anal. Notes.

Amylene. *Syn.* Iso-Amylene. $C_5H_{10} = 70{\cdot}08$. *Manufacture.*—Wash Fusel Oil (B.pt. about 130° C.) with equal volume of salt solution by shaking—this removes Ethyl, Methyl, etc., alcohols. Draw off the upper layer, dry with Calcium Chloride and distil, collect distillate which comes over at 130° C. Mix with twice its weight of fused Zinc Chloride and allow to stand at ordinary temperature three days. (The process is simply one of dehydration, $C_5H_{12}O = C_5H_{10} + H_2O$). Distil on water bath—it boils at 40° C. Collect the fraction coming over at 40 to 60° C. into ice and redistil.

Amyleni Hydras. *Syn.* DIMETHYL-ETHYL CARBINOL, TERTIARY AMYL ALCOHOL $(CH_3)_2 : C(OH)C_2H_5 = 88{\cdot}081$. *Dose.*—30 to 80 minims, flavoured with liquorice. Ph. Ned. V. P.G. VI. has maximum single dose 4·0 Gm. Maximum in 24 hours 8·0 Gm.

Manufacture.— Shake in a closed vessel equal volumes of Amylene, Sulphuric Acid, and water in a freezing mixture for 30 to 40 minutes. Separate any undissolved Amylene. Dilute the acid liquor with two vols. of ice cold water and filter through a filter moistened with water. Neutralise with Sodium Hydrate and distil. Tertiary Amyl Alcohol comes over with a little water. Dehydrate with fused Caustic Potash. Rectify and collect the fraction 99—103° C.

A colourless liquid, of pungent taste and odour, resembling a mixture of paraldehyde and camphor. Soluble in 8 parts of water, also in alcohol. Sp. Gr. 0·815 to 0·820, B. pt. 216° F. Hypnotic, occupying a position between chloral and paraldehyde. **Capsules contain 10 minims in each.** *Dose.*—3 to 6.

Owes hypnotic power possibly to alkyl groups. Dimethyl carbinol is twice as weak as this Dimethyl-ethyl Carbinol and tri-ethyl carbinol is still more powerful. 3 drachms, suspended with Tragacanth Mucilage ½ ounce, flavoured with Licorice and made up to 2 ounces for the dose, have been given as a night draught.—B.C.D. i./14,70.

Amylene-hydrate Carbamate. $NH_2.CO.OC(CH_3)_2.C_2H_5 = 131{\cdot}112$. *Syn.* **Aponal.**

Dose.—15 to 20 grains (30 max.) mild hypnotic. Stated to induce easy and calm sleep in 20 to 30 minutes, also to be free from ill effects on gastro-intestinal tract or other organs. Suggested for use in insomnia due to nervous debility and other causes, and to replace powerful hypnotics.—L. ii./11,1412.

Said to be made by action of Urea Hydrochloride on Amylene Hydrate (Dimethyl-ethyl-carbinol).—P.J. ii./11,442. B.M.J. i./12,733.

Amylene-Chloral, $CCl_3.CHOH.OC_5H_{11} = 223{\cdot}445$. — *Syn.* DORMIOL, a 50% solution; DIMETHYL-ETHYLCARBINOL-CHLORAL. *Dose.*—5 to 50 minims (0·3 to 3 Cc.).

May be prepared by mixing 100 parts of Anhydrous Chloral with 60 parts of Amylene Hydrate. It is an oily liquid slowly forming a clear solution with an equal quantity of water. Soluble at once in large quantities of Water, miscible with Alcohol, Ether and Fixed Oils. Sp. Gr. 1·24, boiling point 93° with decomposition. Absence of Free Chloral is shown by the non-reduction of Ammoniated Silver Nitrate Solution.—P.J. ii./10,392. **Capsules contain 8 minims (0·5 Gm.).** Hypnotic which may be used alternating with others.

Amylum—Starch is obtained from the common wheat (*Triticum Sativum*), maize (*Zea Mays*), rice (*Oryza Sativa*), and potato (*Solanum Tuberosum, N. O. Solanaceæ*).

Tapioca Starch. *Syn.* **Manihot, Manioca or Mandioca Starch, from Brazil** may form a commercial competitor of the varieties in use.

Starch and its structure.—Prof. Larg and Co-workers, P.J. ii./27,398.

Anacardium occidentale.—Cashew Nut. The pericarp of this contain a vesicating oily liquid, which consists of 10% of Cardol (to which the vesicating properties are due), and 90% of Anacardic Acid, $C_{22}H_{32}O_3 = 344·256$. The oil has been used in leprosy, ringworm, ulcers, corns, and internally as a vermifuge. Tincture, 1 in 10 Alcohol 90%. *Dose.*—2 to 10 minims. **Anacardii Folia** were in **Ph. Ned.** The marking nut, from *A. Officinarum*, possesses similar properties.

Ananassa Sativa (Pine Apple). Has been used among the natives in South Africa for diphtheria and diphtheritic sore throat.

Tinctura Ananassæ (Sativæ). *Dose.*—(As digestive) 25 to 30 minims with meals, is prepared by macerating Ananassa Sativa 1 for three weeks in Alcohol (90%) 1¼, adding Glycerin 2 and making up to 4 with Alcohol 90%. After tonsillotomy, painted or sprayed on, prevents the formation of membranous looking exudation, and the stump heals in a few days. Useful in chronic tonsillar abscess. Has been used for dissolving necrosed tissue in quinsy, tonsillitis, boils, etc.

Butyric Ether $C_3H_7CO.OC_2H_5$. *Syn.* **Ethyl Butyrate,** has odour of pineapple. Sp. Gr. 0·9 nearly. B.Pt. 120° C. Diluted 1 in 20 or 1 in 10 in spirit is used as pineapple essence. **Is made from duty-free Spirit, and it behoves the purchaser to procure, fill in and have endorsed a licence from the Board of Customs and Excise, stating that it will be used as a flavouring agent.**

Anchusa Officinalis (*Boraginaceæ*). **Alkanet,** causes the heart to stop in diastole, it yields 5 to 6% red amorphous resin "Alkannin," and contains two red substances, has some relationship to action of Curare.—L. i./06,974.

Anethi Oleum—Distilled from fruit of *Peucedanum graveolens.* It is a yellow oil with odour resembling caraway Sp. Gr. 0·900 to 0·920 approx. Soluble 1 in 3 of 90% alcohol. Some normal distillates of dill-fruit have a lower Sp. Gr. than 0·905, but, since the oil is for medicinal purposes, and the carminative principle is carvone, a high proportion of the latter should be ensured by the minimum Sp. Gr. indicated. English Dill Oil varies in Carvone content and in its physical constants with different seasons.—Finnemore. A high Sp. Gr. should put the analyst or user on his guard for admixture with caraway oil.

Anhalonium Lewinii.—Mescal Buttons, the tufts of young leaves of the plant are eaten by the Mexican Indians to produce intoxication accompanied by visions. Effects due to alkaloids, *e.g.* $\boxed{\text{P1}}$ Mescaline.

A liquid extract of commerce diluted, on an empty stomach, had no effect in 50 minims. 100 minims, however, in 15 minutes produced slight dyspnœa and transient headache, then intermittent tetanoid spasms in hands and feet, with sensation of 'delightful feeling of irresponsibility.'

Anisi Fructus (*B.P.* '14). Anise. Dried ripe fruit of *Pimpinella Anisum.* Linn. (*Umbelliferæ*). Contains **Oleum Anisi** which is also distilled from the Star Anise (*Illicium verum, N.O. Magnoliaceæ*), the latter being that used almost entirely in this country. *Dose.*—½ to 3 minims. Aromatic and carminative. Colourless or yellowish oil congealing between 10 and 15° C. Sp. Gr. at 20° C., 0·975 to 0·990. **Aqua Anisi.**—Anise Fruit 1 pound, Water 2 gallons. Distil ½. **Spiritus Anisi.**—1 in 10 in Alcohol 90%. *Dose.*—5 to 20 minims.

Eau de Botot—Anise Oil 20, Peppermint Oil 13, Saffron Tincture 5, Alcohol 70% to 1,600. Some formulæ contain Cinchona, Rhatany, Cloves, &c.

Anethol (P. Belg., P. Austr., P. Jap. III.). $C_{10}H_{12}O = 148·146$. The Stearoptene from the Anise Oils melts at 20° C., B.pt. 230° C. Soluble in Alcohol 90% 1 in 3 approximately. *Dose.*—½ to 2 minims.

In infantile colic give 2 minims of Anise oil followed by a drachm of castor oil.

Anthemis nobilis (*Compositæ*).—*Syn.* 'English' or 'Roman.' Chamomile Flowers. The largest, most 'double,' and whitest flowers are preferred. Tonic, aromatic, stomachic, emetic in large doses. In addition to the Extract, B.P. '98, *dose* 3 to 8 grains, Infusion, and Oil, a Tincture, 2 of single fresh flowers in Alcohol (90%) 3, and Water 1, are made. The latter is used for summer diarrhœa of children. *Dose.*—3 to 10 minims.

Oleum Anthemidis.—Distilled from the flowers of the Roman chamomile. Sp. Gr. 0·905 to 0·915 (*B.P.* '14). Soluble in less than its own vol. of 90% alcohol.

'German' Chamomile Flowers are those of *Matricaria Chamomilla.*

They have a hollow conical receptacle and no bracts, whilst *A. Nobilis* flowers have solid receptacles and are covered with concave, blunt, narrow bracts.

Anthemis cotula. 'Mayweed,' common in the fields, caused a bullous eruption.—J. H. Sequeira, L. ii./21,560.

Anthoxanthum odoratum.—Sweet Vernal Grass. Flowers develop odour of coumarin on drying. Tincture, 1 of fresh-flowering herb in 10 of 40 O.P. spirit (making allowance for the moisture the plant contains). *Dose.*—2 to 6 minims internally and diluted as a nasal lotion for hay fever.

Apis Mellifica.—The Honey Bee. A Tincture—*Dose* 1 minim hourly, is said to relieve urticaria. See also Acid Formic.

Arachis Hypogœa. (*Syn.* Pea Nut, Gound Nut, Goober Nut, Manilla grain, Chinese Almond).—The seeds of the plant form the 'pea nuts' of commerce. Have dry, brittle envelope and yellowish-white kernel. Very rich in a non-drying oil (40 to 50%) which is *B.P.* '14 with Sp. Gr. 0·916 to 0·921. Ground down they are employed as cake for cattle. Eating the kernels causes a desire to drink.—L. i./17,670.

Emulsio Olei Arachis cum Glucose. Gt. Orm. H.

Peanut Oil 15, Saccharated Lime Solution 4, Gum Acacia 2½, Oil of Cassia 1/40, Oil of Cloves 1/40, Chloroform 1/10, Liquid Glucose 30, Decoction of Irish Moss to 60.

Arbutin, $C_{12}H_{16}O_7 + \frac{1}{2}H_2O = 281{\cdot}136$.—A crystallised glucoside obtained from the leaves of *Arctostaphylos Uva-ursi* (*Ericaceæ*) U.S. X. (Fluidextractum 1=1 Glycero-hydro-alcoholic). *Dose.*—Average 30 minims. Bearberry, and other ericaceous plants. Soluble 1 in 8 in cold water. It is given for chronic cystitis and vesical catarrh, in dose of 5 to 15 grains with sugar; is not poisonous. Infusion (*B.P.* '14) 1 ounce to 1 pint of boiling water. Antiseptic; also as vermifuge for dogs 60 to 100 grains. Arbutin, given *per os* is partly decomposed with formation of Hydrokinone but most of it is absorbed by the kidneys.—Dixon.

For preparation of True Arbutin see Edn. XVII., p. 781.

Busserole Fr. Cx. = Uva Ursi Folia. *Average dose* (U.S.) 30 grains.

Infusum Uvæ Ursi Concentratum, B.P.C. by *b.* process under Infusa Concentrata. *Dose.*—½ to 1 drachm.

Areca, Semen Arecæ, P.G. iv. Betel Nut. B.P. Add 1874.—From *Areca Catechu* (*Palmaceæ*). *Dose.*—1 to 4 drachms. Is astringent, and is used as a vermifuge, especially for dogs; is also used as a masticatory and added to dentifrices. Contains several alkaloids, the most active being $\boxed{\text{P1}}$ **Arecoline** (about 0·1%). $C_8H_{13}NO_2 = 155{\cdot}112$, a liquid which forms a crystalline soluble $\boxed{\text{P1}}$ **Hydrobromide** P.G.VI., Fr. Cx., P. Helv., P. Hung., P. Bor. VII., P. Svec. X., $C_8H_{13}NO_2,HBr$. Fr. Cx. gives maximum single dose 0·0005 Gm. ($\frac{1}{120}$ grain approx.) and maximum daily dose 0·0015 Gm. ($\frac{1}{40}$ grain), approx. Its physiological action is allied to that of pelletierine and pilocarpine. It is sialogogue and diaphoretic. Resembles physostigmine as a myotic, 1% solution suitable. Serviceable in glaucoma. The Alkaloids have been chemically examined.—J.C.S.A., Feb., 1919, p. 93.

Betel Nut Chewing. The ingredients are betel leaf, areca nut, black catechu, lime, turmeric, paste and tobacco leaf. Details as to betel nut (oral) carcinoma. In Siam betel nut chewing is more done by women than men. The habit prevents decay of teeth, but leads to chronic changes of mucous membrane of the mouth, causing loosening and loss of teeth.—A. G. Ellis, B.M.J. ii./21,808; Jl. Trop. Med., June 1/22,149.

Tenaline, a liquid specialty, used in veterinary practice; is an efficient vermifuge. *Dose,* 1 minim for each pound of the weight of the dog.

Arnicæ Flores (*B.P.* '14).—*A. montana.* Dried flower heads. Acrid stimulant equivalent in effects to Arnica rhizome. **Tinctura.**—*Dose.*—½ to 1 drachm. 1 in 10 Alcohol 70%.

Arnica dermatitis.—Arnica often used by the public for bruises and injuries, but may produce dangerous rashes. Under saline purges and sedative ointment rash and irritation subsided.—B.M.J. ii./12,1707.

Arnica Root found adulterated with the roots of *Asclepias vincetoxicum*, distinguished by yellow colour of section, large Calcium Oxalate cells and small starch grains—per P.J. ii./25,312.

Arum Maculatum.—The berries of the plant known as 'Lords and Ladies' act as an irritant poison causing excoriation of the mouth and sometimes bleeding and convulsions, and the tongue sometimes swells so as to fill the mouth and prevent swallowing. The swelling is best reduced by bleeding.

For further details of the plant see a description by E. M. Holmes.—P.J. i./15,324. **Succus Ari** prepared from the leaves. *Dose.*—1 drachm. Has been used in neuralgia.

Asafetida.—Gum resin obtained by incision from the root of *Ferula Fœtida* and probably other species. Coat pills first with mucilage and afterwards with Pill Varnish to cover the odour—not with silver, which would blacken. Nervine stimulant expectorant and carminative. **Emulsum Asafœtidæ**, U.S. Asafœtida 40, Water to 1,000. **Enema Asafetidæ**, L. H. Tincture of Asafetida, ½ ounce. Starch Enema to 4 ounces. **Tincture** (*B.P.* '14). 1 in 5 Alcohol 70%. *Dose.*—½ to 1 drachm. U.S. 1 in 5. *Average dose.*—15 minims. ***Flavoring.***—Syl Menthæ Piperitæ, Syl Limonis, Syl Coriandri. Syrupus Zingiberis not much good. **Liquor Antihystericus.**—*Dose.*—¼ to 1 drachm. On the Continent a mixture is used of Camphorated Spirit of Ether and Asafetida Tincture equal parts.

Threatened appendicitis. Flatulent distension often remarkably improved by moderate dose of castor oil combined if necessary with enemata of Turpentine and Asafœtida. Change in iliac swelling often effected.—B.M.J.i./09,1285.

Chemical details on Asafetida XVIIth Edn., p. 782.

Asclepias incarnata.—White Indian Hemp rhizome. Is a speedy, potent and reliable diuretic.—Pr. xxiii. 141. Tincture, 1 in 10. *Dose*, 5 to 40 minims.

Asclepias tuberosa.—Pleurisy Root. Is expectorant and diuretic. Tincture, 1 in 10. *Dose.*—5 to 40 minims.

Asparagin. *Syn.* ALTHEIN. Amido-Succinic Acid Amide $C_2H_3(NH_2)$ (COOH). $(CONH_2)$, $H_2O = 150{\cdot}096$. *Dose.*—1 to 2 grains. White crystals, having a slight acid reaction. May be obtained from *Asparagus officinalis*, and the roots of liquorice, belladonna, &c. Soluble 1 in 50 of water, also in acid and alkaline solutions. Insoluble in absolute alcohol and ether. An aqueous solution dissolves freshly precipitated mercuric oxide, and this has been used for hypodermic injection in syphilis. Has decided diuretic effect. For cardiac dropsy and chronic gout one grain is given three times a day.

Aurantium. **Aqua Aurantii Floris** (*B.P.* '14), **Aqua Naphæ, Ph. Ned. V.** *Dose.*—½ to 2 drachms of the diluted water. Distilled from the flowers of the bitter orange, *Citrus Aurantium*, var. *Bigaradia.* It is a saturated solution of the oil, and must be diluted immediately before use with twice its volume of distilled water.

Oleum Aurantii Dulcis expressed from the fresh peel of the fruit of the sweet orange, Citrus Aurantium. (*Oleum Aurantii Amaræ* is obtained from the peel of the fruit of the bitter orange.) Sp. Gr. at 15° C. 0·847–0·852 O.R. + 96° to + 98° at 20° C. (at Messina). **Terpeneless Oil of Orange** is prepared, being many times more potent in flavour and soluble in 60% spirit, *cf.* Vol. II. **Oleum Neroli.** The oil obtained in the distillation of above flowers is used in perfumery. Dilution with twice its volume of absolute alcohol preserves it. *For analytical data, vide Vol. II.*

Cortex Aurantii (*B.P.* '14 and **Indicus**).—Dried and fresh outer peel of the Bitter Orange (in India other varieties may be used if aromatic and bitter). **Tinctura Aurantii** (*B.P.* '14). 1 of fresh peel in 4 of Alcohol (90%). *Dose.*—½ to 1 drachm. Boa says that 90% Alcohol is too strong—it takes out the whole essential oil content, terpene, citral, etc. About 10% only of Essential Oil of Orange Peel is flavouring and is soluble in comparatively dilute alcohol, therefore make the Tincture using equal volumes of 90% alcohol and water. Some have suggested 70%. Mixtures containing Salts of Iron will become dark in colour with all preparations of orange peel. **Syrupus Aurantii** (*B.P.* '14). Tincture of Orange 1, Syrup 7. *Dose.*—½ to 1 drachm. **Vinum Aurantii. Orange Wine** (*B.P.* '14).—Made by 'fermentation of a Saccharine Solution to which fresh Bitter Orange Peel has been added.' It contains 12 to 14% by vol. of Ethyl Alcohol. In practice a boiling 25% Sugar Solution is poured on to the peel and allowed to stand for 24 hours. Yeast is added and the liquor fermented at 20° C. for 3 days. It may be necessary to fortify with spirit.

Avena Sativa.—Tincture of the oat, 1 in 5 made with 60% alcohol, in 20 minim doses relieved pruritic condition induced by eruption in dermatitis.

Azadirachta Indica. The bark was in I.C. Add. Generally called *Melia Azadirachta.* *Syn.* **Nim or Neem, Margosa**, is common throughout India—mostly planted. In malaria its efficacy is very doubtful.—I.D.C. 1916.

Margosic Acid.—From Oil of Margosa Seeds. The Sodium and Potassium

Salts being soluble can be given *per os.* The Calcium and Zinc Salts for local use in skin affections.—Chatterjee & Ray, Ind. Jl. Med. Res. 1918, 5,656 abst., Y.B.P. 1919, 182. See also Ind. Jl. Med. Res., Oct., 1920.

In tropical granulomata Sodium and Potassium Margosates in 2 to 3 grain doses in 4% solutions intramuscularly have been tried, but caused irritation. Intravenously blocking of the veins occurred. Ethyl Margosate as a further step has been employed; it is non-irritant and has antiparasitic and bactericidal properties.—K. K. Chatterji, L. ii./25,1063.

Badiane. Fr. Cx. 1908 is Star Anise Fruit *q.v.* **Teinture de Badiane.** Fr. Cx. 1884. 1 in 5 by weight, Alcohol 80%.

Balsamum Gurjunæ.—Gurjun Balsam, Wood Oil. *Dose,* ½ to 2 drachms. from *Dipterocarpus turbinatus* and other species. Used in gonorrhœa and as an expectorant, given with malt extract. To test for *vide* Copaiba.

Balsamum Peruvianum (*B.P.* '14). *Dose*—5 to 15 minims. From trunk of *Myroxylon Pereiræ,* U.S. *Toluifera Pereira* (*Leguminosæ*). A viscid liquid insoluble in water, soluble in chloroform, absolute alcohol and glacial acetic acid; slightly in ether and petroleum benzine. Contains Cinnamein and Cinnamic Acid. Sp. Gr. between 1·14 and 1·158. "Synthetic" Balsam may be detected by shaking 2 Gm. with 10 Cc. of Petroleum Spirit. Evaporate the Petroleum Solution on a water bath, dry on same 10 minutes, cool, and add three drops Nitric Acid 1·38. Mix. Peru balsam gives a golden yellow colour. Inhalation of a few drops of vapour 1 in alcohol 2 in a little hot water useful in pharyngitis. As a dressing to wounds, if aseptic, may be left for 20 days if necessary. Scabies has been treated with a paint of Balsam 3, Glycerin 1. But test for albumin in urine both before and during treatment. **Balsamum Lanolinatum.**—Lanolin 5,000, Vaselin 2,000, Balsam Peru 12, Otto 4.—Ph. Notes (Denmark). C.X. has **Unguentum Balsami Peruviani.** Peruvian Balsam 1, Lard 7. Wyatt Wingrave's formula: Balsam of Peru 20, Trikresol 5, Vaselin *q.s.* to 100. Mix warm. Ⓟ Lotio Balsami Peruviana.—MacNaughton Jones suggested in alopecia a preparation of Peru Balsam 1 drachm, Spirit of Rosemary 1 ounce, Tincture of Cantharides 4 drachms, Pilocarpine Nitrate 2 grains, Almond Oil 1 ounce. This is applied at night, and washed off next morning with a borax and spirit lotion.

For **scabies** an ointment containing Peruvian Balsam and Sublimed Sulphur 4½% of each, in Soft Paraffin.—W. Knowsley Sibley (Treatment of Skin Diseases.)

Menciere's Solution, *q.v.* contains Peruvian Balsam.

Balsamum Tolutanum (*B.P.* '14). *Dose.*—5 to 15 grains. Obtained from the trunk of the *Myroxylon Toluifera* (*N.O. Leguminosæ*). Recently prepared is soft, but becomes brittle in cold weather. Soluble 1 in 1 alcohol 90%. A standard of total aromatic acids is required. **Syrupus Tolutanus** (*B.P.* '14). *Dose.*—½ to 1 drachm. This is made by digesting the balsam and water on the water bath ½ hour. U.S. is Tincture of Tolu (1 in 5 of Alcohol 94·9% vol.) 5 parts, Sugar 82, Magnesium Carbonate 1, Water to 100 *s.a.* **Tinctura** (*B.P.* '14) 1 in 10 alcohol 90%. *Dose,* ½ to 1 drachm. The balsam has the properties of the Cinnamic and Benzoic Acids it contains.

Baptisin. *Dose,* 1 to 3 grains. An extractive from Baptisia tinctoria, in small doses a laxative, in large doses a cathartic. Tincture 1 in 10 of Alcohol 60%. *Dose.*—5 to 30 minims. The Mother Tincture of Baptisia (Homœopathic) has a reputation for treatment of boils. Baptisol a phenol responsible for the blackening of the leaves on bruising or treating with chemical agents.—P.J. ii./15,761.

Ⓟ **Barii Chloridum. — Barium Chloratum, P.G. VI.** $BaCl_2 2H_2O$. *Dose.*—½ to 1½ grains. Max. single 3 grains or 9 grains per diem. Colourless crystalline plates, with bitter saline taste. *Soluble* 1 in 2½ of water. Solution is destructive to bacteria. *Incompatible* with sulphates, phosphates, tartrates and carbonates.

Mostly used for analytical purposes, but is of value as a heart tonic; has alterative properties; has been tried for syphilis and scrofula. Also 1% solution as eye wash in scrofulous inflammation. Varicose veins are treated by internal use, and applied locally over the distended vessels.—H. Barium Chloride, 0·03 Gm., three or four times daily by the mouth is sometimes of value in Stokes-Adams attacks.—L. i./27,401. In the form of **Barium Water** (*vide* Mineral Waters) it has also been used for glandular swellings. *Antidote.*—Sodium Sulphate.

Ⓟ**Barii Nitras**. Ba $(NO_3)_2$ = 261·386 and Ⓟ**Barium Acetate** $(CH_3COO)_2Ba$ = 255·413 are employed in place of the chloride for testing.

Bassia Latifolia. MOWRA FLOWERS in India. A potable spirit can be prepared from them as they contain much fermentable sugar. The seeds yield *Mowrah Butter* melting at 24° to 25° C.; this fat is also suitable for candle and soap making (*cf. B. Longifolia*), also as a food, but it soon becomes rancid in the hot climate.

Bassia Longifolia. N.O. *Sapotaceæ.* The seeds of this tree growing in Southern India and the Malay States are called Mowrah Seeds. *Syn.* Illipi Nuts; they yield 43 to 52% of yellowish solid fat M. pt. 42° C. and solidifying at 36° C., containing about 80% of stearin and is suitable for candle making. The residue contains a Glucoside 'Mowrin.' This yields 'Mowric Acid.' Both have a digitalis-like action, but they have an injurious effect.

Beberinæ Sulphas. *Syn.*—Buxine and Pelosine. Probably a mixture of Sulphates of Beberine and Nectandrine. *Dose*—1 to 10 grains; if in a mixture a little Aromatic Sulphuric Acid covers its bitterness. It is in scales, and is prepared from the bark of *Nectandra Rodiœi*, Bebeeru bark. It is also contained in Pareira Root. It is freely soluble in water. **Beberine Hydrochloride** is in reddish brown scales. Use, antipyretic and tonic as Quinine; useful for menorrhagia.

Belæ Fructus (BAEL FRUIT), *B.P.* '14.—*Ægle marmelos* (*Rutaceæ*). Fresh half ripe fruit. Mild astringent. The fresh fruit is useful in dysentery and in dyspepsia. **Extractum Liquidum** (*B.P.* '14). *Dose.*—1 to 2 drachms.

Syrup Ægle Marmelos Co. *Dose.*—Half to 1 ounce with water thrice daily. Is a proprietary in India, containing Bael Root, Cyperus Rotundus, Ginger and Plectranthus Zeylanicus. Stomachic in diarrhœa and dyspepsia.

Berberinæ Carbonas $C_{20}H_{17}NO_4$ $H_2CO_3 + 2H_2O$ = 433·192 or $+5H_2O$. *Dose.*—2 to 5 grains.

Although contained in Hydrastis and Calumba, is obtained principally from the bark of *Berberis vulgaris* and other species of Barberry. In bitter yellowish crystals, insoluble in water. Its salts, the **Hydrochloride, Phosphate,** and **Sulphate,** are bright yellow in colour, and soluble in water, the hydrochloride about 1 in 400, the phosphate 1 in 12, and the sulphate 1 in 150. *Dose* of each.—2 to 6 grains. Given for indigestion, diarrhœa, malaria, and sickness in pregnancy. Berberis Berries (Baies) are official in FR. CX. as ingredient in Electuaire diascordium.

Elixir Berberinæ. *Dose.*—1 to 4 drachms. Contains Berberine Hydrochloride 1 grain per drachm.

Berberis (*B.P.* '14).—*B. aristata* (*Berberidaceæ*). Dried stem. Tonic. Extract is known as 'Rasot' in India. Used in intermittent fever.

Liquor Conc., I.C. Add., 1900.—*Dose*, ½ to 1 drachm. Alcohol 20%, 1 in 2.

Tinctura, *B.P.* '14. *Dose.*—½ to 1 drachm. Alcohol 60%, percolate 1 in 10.

Berberis Aristata and other species. Study of structure of the stems.—G. R. A. Short, P.J. ii./26,189.

Betel. *B.P.* '14.—*Piper betle.* (*Piperaceæ*). Dried leaves. The fresh leaves are contained in PAN (Beng.). Stimulant, narcotic, masticatory.—Externally in sore throats.

Blepharis Capensis.—The Cape Gooseberry of South Africa. Tincture, 1 in 8 of 90% Alcohol. *Dose.*—15 minims (1 Cc.). Has been used in snake and insect bites and for toothache.

Blighia Sapida.—Vomiting sickness of Jamaica caused by poison produced by the immature fruit.—B.M.J. ii./17,109.

Boldoa fragrans (*Peumus Boldus*). *Dose.*—1 to 3 grains in cachet or capsule. The leaves, from Chili and Bolivia, resemble those of Sweet Gale (*Myrica Gale*), but are more aromatic. In dyspepsia, liver affections, rheumatism, and as a diuretic for atony of the bladder. **Tinctura Boldoæ,** 1 in 5 of 90% alcohol. *Dose.*—10 to 20 minims. The inhabitants in South America take half a litre of strong decoction a day for hepatic diseases.

Bonduc Nut.—The Seeds of *Cæsalpinia bonducella* are used in India as a tonic and febrifuge—generally mixed with black pepper for the purpose.

Brucea Sumatrana.—A plant indigenous to China and S. Asia. The seed known as El Kossam is said to be useful in dysentery, diarrhœa, and menorrhagia.—*Cf.* B.M.J. i./13,1403.

P1 **Brucine,** $C_{23}H_{26}N_2O_4 + 4H_2O$ = 466·288. *Dose.*—$\frac{1}{12}$ to ½ grain. An alkaloid from *Strychnos Nux Vomica* seeds—small white acicular crystals, with bitter taste. Very soluble in Alcohol and Chloroform. Its salts are soluble in water. Like Morphine it gives a red colour with nitric acid (*see* Water Analysis), which Strychnine should not. It is said to possess only $\frac{1}{12}$ of the physiological power of Strychnine. For epilepsy the P1 Hydrochloride, $C_{23}H_{26}N_2O_4.HCl = 430·689$, has been given as liquor, same strength as Liquor Strychninæ, in 10 minim doses increased until ½ a grain is reached. P1 **Brucine Sulphate** $(C_{23}H_{26}N_2O_4)_2.H_2SO_4 = 686·528 + Aq.$ White crystals soluble 1 in 80 in water. For Dixon's results of comparison with strychnine, *vide* Strychnine.

Bryonia. *Syn.*—Vitis alba; White Bryony.

B. dioica is the only species commonly found in this country—hence called English Bryony. Contains an amorphous glucosidic bitter substance and an amorphous alkaloidal principle—intensely bitter. Chemical Notes and refs. 17th Edn., p. 785

Tinctura Bryoniæ. B.P.C.—From bruised fresh roots of *Bryonia alba* or *B. dioica* (*Cucurbitaceæ*) a tincture is prepared corresponding in strength to 1 of dried root to 10 of alcohol (60%). *Dose.*—1 to 10 minims (0·06 to 0·6 Cc.) or more. Useful in pleurisy. Relieves the pain and allays the cough. In large doses it is an active cathartic, used for dropsy. It also checks metrorrhagia. The fresh plant applied to the skin will cause vesication.

Buchu (*B.P.* '14). The dried leaves of *Barosma betulina* (*Rutaceæ*) contain volatile oil and mucilage. Carminative and diuretic. Buchu has antiseptic action in irritability of bladder and for gonorrhœa. The **infusion** (1 in 20 boiling water) is representative of the activity of the drug. *Dose.*—1 to 2 ounces. *Flavoring.*—Syl Aurantii Floris, Syl Lavandulæ; Syrupus Aromaticus. **Tincture** (*B.P.* '14) 1 in alcohol 60% 5. *Dose.*—½ to 1 drachm. **Fluidextract,** U.S. *Dose.*—30 minims. 1=1 hydro-alcoholic percolate. Buchu Cultivation and differentiation from other members of the *N.O. Rutaceæ* in South Africa. The dried leaves of *B. betulina* should yield 1·45% of oil.—P.J. ii./21,308.

Buteæ Semina (*B.P.* '14.)—*B. frondosa.* (*Leguminosæ*). Dried kernels freed from testæ. Contains Moodooga Oil. Anthelmintic like Santonin.—P.I. 79, 446; E.P.I. i. 550; Pg. I. i. 454. Pulvis (*B.P.* '14).—*Dose.*—10 to 20 grains.

Caapi or '**Ayahasco,**' the root or rhizome of the woody vine *Banisteria caapi*, is used in Bolivia as a stimulating beverage. It gives courage and fortitude in facing danger and suffering. Three alkaloids have been isolated, one being related to Morphine. This drug and *Miré* (a muscular paralysant of the Nightshade family) may have therapeutic applications.—L. ii./25,30.

Cajuputi Oleum. From leaves of *Melaleuca Leucadendron* and other species. Sp. Gr. 0·919 to 0·930. Further chemical notes: 17th Edn., p. 785.

Gastric flatulence is at once relieved by Spirit of Cajuput 8 minims, Sal Volatile 25 minims, Spirit of Chloroform 15 minims, Spirit of Peppermint 12 minims—taken in a wineglass of water.—A. P. Luff, B.M.J. i./14,635.

Calendula Officinalis (*Compositæ*). Dried florets. *Dose.*—15 grains. Tincture 1 in 5 Alcohol 96%. *Dose.*—5 to 20 minims. Applied to wounds, and is given in amenorrhœa. It has diuretic and stimulant properties.

Calumba (*B.P.* '14). Dried root, sliced, of *Jateorhiza Calumba* (*Menispermaceæ*).

Non-astringent tonic for simple debility and indigestion. Can be given with Salts of Iron. Infusion 1 in 20 (cold water); Tincture 1 in 10 Alcohol 60% (U.S. X. 1 in 5). *Flavoring.*—Glyl Aurantii Amari (double dose), Glyl Lavandulæ, Syrupus Aurantii Amaræ. Was represented in I.C. Add. by *Coscinium fenestratum* (false Calumba Root). Calumba is sometimes termed 'Radix Fraseri.'

Cambogia, U.S., P. Austr. *Dose.*—½ to 2 grains. FR. CX. Gomme Gutte. Yellow Gum Resin from *Garcinia Hanburii* (*Guttiferæ*) growing in Siam A powerful purgative. May cause severe griping. Will expel tapeworm. Is rarely now given alone.

Canella Alba. Wild Cinnamon (*Magnoliaceæ*) contains Aromatic Oil. Stomachic.

Cannabis Sativa (*Urticaceæ*), Russian hemp-seed, oil-free (extracted by Benzine) has been used in form of decoction, strength 100 Gm. in 1 litre, heated gently and evaporated (without boiling) to 250 Cc. 35 to 50 Cc. of the resulting liquor are given to children in the food. The dried hemp seed freed from oil contains 1·5% Phosphorus in organic combination as against 1% before the fat is removed. Children are said to greatly improve under the treatment.

Emulsio Seminum Cannabis.—10% in water. Used as a potion against gonorrhœa, two glasses daily. Has slight sedative properties.—(Russia) Ph. Notes.

Carbo Animalis. ANIMAL CHARCOAL. B.P. '85. **Carbo Animalis Purificatus** B.P.'85 was treated with hydrochloric acid. **Carbo Ligni** (*B.P.* '14), U.S. **Wood Charcoal.** *Dose.*—60 to 120 grains. Made by burning wood, *e.g.*, willow, to red heat with access of as little air as possible. In cachets or as charcoal biscuits as an absorbent in distension of the stomach, *e.g.*, in dyspepsia. Is antiseptic, and is used externally as a poultice to foul ulcers. COCOA NUT CHARCOAL was employed by Dewar owing to its remarkable powers of absorbing gases to improve high vacua.

Charcoal as an absorbent might be useful in cholera, typhoid, gastroenteritis.—P.J ii./12,98. As antidote. *See* Poisons and Antidotes.

Norit. *Syn.* **Activated Charcoal.** *Dose.*—5 Gm. (75 grains) in water three or four times daily. A special variety of vegetable charcoal with high adsorbing qualities, containing 85% ashless vegetable charcoal and less than 5% mineral matter. *Uses.* Similar to ordinary charcoal in gastric and intestinal affections. Locally useful for suppurating wounds and ulcers.

Norit Tablets, 5 grains each. Useful protective against infection *via* the tonsils and air passages. It adheres to the mucous membrane.

By the use of Norit the strength of such solutions as 1% Mercuric Chloride and 1% Morphine Hydrochloride could be greatly reduced.—L. i./23,342.

Experiments *in vitro* on absorption of poisons showed that the new plant Charcoal, 'Supra-Norit,' was in all cases more active than 'carbo animalis' (Merck).—J.C.S., A. i./25,736.

Carbonis Bisulphidum. CS_2=76·128. A clear liquid with characteristic odour Sp. Gr. 1·268 to 1·269. Very slightly soluble in water, but readily in Alcohol, Ether and Chloroform and the fixed and volatile oils. Dissolves Phosphorus Sulphur and Rubber with avidity. Is poisonous, but has been employed in treatment of phthisis.

Acute poisoning by, respirations very slow (about 12 per minute). Expiration deep, prolonged and blowing; heart not much affected, but pulse weak. —Amer. Med., May 27/05; M.A., 1906,12.

In tuberculosis, inhaled, useful, has no disagreeable after effects. Is parasiticide. In fibrinous pneumonia small doses with water have been used.

Odourless Carbon Disulphide. Carbon Disulphide is shaken with Mercury, separated, and allowed to stand for a short time in the presence of 2% of pure fat. On distillation, practically odourless Carbon Disulphide is obtained. —P.J., i./25,518.

Cardamomi Semina. Dried ripe seeds of *Elettaria Cardamomum* (*Scitaminaceæ*). The seeds should be removed from their pericarps when required for use. Given in atonic dyspepsia. Contained in **Pulvis Aromaticus. Tinctura Cardamomi Composita** (*B.P.* '14). *Dose.*—½ to 1 drachm. Cardamom Seeds 1·4% with flavourings. Raisins now omitted and 45% Alcohol *vice* 60%. Tincture, U.S., 1 in 5 Alcohol (48·9% vol.). **Compound Tincture,** U.S. X., Cardamom 20, Cinnamon 25, Caraway 12, Cochineal 5, Glycerin 50, Alcohol (48·9% vol.) to 1,000. Compound Cardamom Tincture is incompatible with Alkaloidal salts, Bismuth Oxide, Oxycarbonate and Subnitrate: employ Liquor Bismuthi in preference. It is also incompatible with metals of the alkaline earths and with Sodium Bromide.—P.J. i./06,218.

Gelatinous flaky deposit in the Tincture due to Caraway and Cochineal. Suggested use of Sugar instead of Glycerin, slightly stronger Alcohol and the marc not pressed.—J. H. Franklin and J. Greenhalgh, B.P. Conf. 1923. —P.J. ii./23,96.

Colour of Compound Tincture of Cardamoms depends on change of *p*H. A buffer salt added—to give a constant *p*H of 7—stabilises. There should be no contact with Iron or Copper in percolation. 60% Alcohol should replace 45%.—R. R. Bennett and G. Middleton, P.J. ii./26,173.

Carminum.—Red colouring matter, containing about 50% Carminic Acid, $C_{17}H_{18}O_{10}$ = 382·144, prepared from the cochineal insect—*Coccus Cacti* (*Hemiptera*), the dried fecundated female insect reared on *Nopalea Coccinellifera* and other species of *Nopalea.* The sun-dried insects, if killed by sulphur or charcoal fumes, are silvery colour and designated 'silver grain,' owing to deposit of wax on the surface. If killed by hot water and dried artificially the 'black grains' are produced. It is insoluble in water, but entirely soluble in aqueous ammonia. Is used to colour toilet preparations and for staining in microscopy.

Nature and Structure of Cochineal. An exhaustive paper.—Am. Jl. Ph. Aug., 1913.

Carminic Acid is a hydroxyanthrapurpurin.—J.C.S.A. i./20,442.

Carmalum. Carminic Acid 1, Ammonia Alum 10, Distilled Water 200. Heat to dissolve. Cool and filter. Suitable for staining after osmic acid. *cf.* Mayer's Carmalum. **Liquor Carmini.** Carmin 1, Distilled Water *q.s.* to moisten, Strong Solution of Ammonia 1, dissolve, and add Water 10. Used to colour toilet preparations, &c. **Tinctura Cocci (B.P. '14).** 1 in 10 Alcohol (45%). *Dose.*—5 to 15 minims.

Liquor Cocci, Liquid Cochineal. Cochineal (not bruised), Potassium Carbonate, of each 1, Distilled Water 8. Heat in water-bath for half an hour, gradually add Acid Potassium Tartrate 1, stir well, continue the heat, and add Potash Alum (in powder) 1; heat five minutes more, strain through absorbent wool and pour over contents of strainer sufficient Distilled Water to make strained product measure 8; when cold add Chloroform ½% by volume. As indicator in titrations the official tincture may be used. Suitable for titrating alkaloids with mineral acids, the alkaloids giving the same colour as mineral alkali. Ipecacuanha Alkaloids give trouble however.—Am. Jl. Ph., Nov., 1911, p. 158.

Carui Oleum. *Syn.* OLEUM CARI, U.S.—Caraway Oil. *Dose.*—½ to 3 minims. Distilled from fruits of Carum Carvi (*Umbelliferæ*) (content up to 7%), and rectified. Colourless or yellowish oil. Sp. Gr. 0·910 to 0·920. **Soluble in equal vol. of 90% Alcohol.—*B.P.* '14.**

Carvonum, P. Austr. *Syn.* Carvol. $C_{10}H_{14}O = 150{\cdot}112$. A yellowish or colourless liquid prepared from the oil has Sp. Gr. 0·960—0·964. Soluble 1 in 2 diluted alcohol. See also Allen, 1911, vol. iv., p. 214, for method of determination, &c.

Caryophylli Oleum.—Clove Oil. *Dose.*—½ to 3 minims. Colourless to brownish oil. Distilled from the flower buds of *Eugenia Caryophyllata* (*Myrtaceæ*). Sp. Gr. 1·047 to 1·065. B.P. '14. Soluble 1 in 3 of 70% Alcohol. Should contain at least 85% Eugenol (B.P. '14 and Ph. Ital). Aromatic carminative. Given with advantage both internally 3 to 5 minims, and injected hypodermically in phthisis 5 minims in olive oil. A satisfactory disinfectant for the hands (said to be even more efficient than Mercuric chloride), catheters, catgut, &c.

Castor Oil as an adulterant to the extent of 10% has been found in Clove Oil. The Oil was dextrorotatory. Treated with steam the residue was easily detected. Sap. V. 179, soluble in 90% Alcohol, insoluble in Petroleum Ether.

Tinctura Caryophylli 1 in 8 Alcohol 90%. Digest 10 days. *Dose.*—20 to 40 minims or more; valuable aromatic, carminative and stimulant.

In senile flatulence good effects by powdered cloves, better even than a fluid preparation. Spirit of cloves is absorbed in the stomach, but the woody fibre passes on to the seat of the complaint. 5-grain Stearettes might be tried.

Catha Edulis. *Syn.* **Kat** or **Khat.** *Dose.*—1 drachm to ½ ounce (4 to 15 Gm.) infused in about 6 to 8 ounces of hot water as required. A sprig of about 10 leaves weighing about 10 grains is chewed at a time by natives. The shrub grows wild in Abyssinia and along the East Coast of Africa. It is cultivated for native use in Arabia. The taste is slightly astringent, and at the same time sweet and resembling licorice.

Three alkaloids were isolated by Stockman—*Cathine* (very soluble in water), *Cathinine* (not very soluble in cold, but more so in hot), and *Cathidine* (insoluble).

In man they all act chiefly on the cerebrum and spinal cord, causing stimulation or much excitement according to dose, and Cathine alone induces slight drowsiness at first.

The herb is a stimulant narcotic. It has been known for generations for its sustaining power. The activity of the leaves when used in an infusion in the same manner as tea or coffee, or when chewed (as by the Arabs), is stated to cause 'staying power,' wakefulness and refreshment. Further details in our Edn. XVII. p. 272, and XVIII. p. 291. It is thought to have power in strengthening the action of the bowels. **Extractum Cathæ.**—*Dose.*—2½ to 10 grains (0·18 to 0·6 Gm.). A solid extract made with 60% Alcohol, 1=4 of leaves for use in pill or **Tablets** (2½ grains each. *Dose* 1 to 4).

Extractum Cathæ Liquidum. *Dose.*—1 to 5 minims (0·06 to 0·3 Cc.). Strength 2=1, prepared with Alcohol 60%. This preparation should be recently made. **Effervescent Catha and Phenolphthalein.**—*Martindale. Dose.*—1 to 2 teaspoonfuls in ½ tumbler of warm water a good ½ hour before breakfast. A tonic laxative combining the effects of the active principles of Catha with the mild purgative properties of Phenolphthalein. **Catha, Milk and Glycerophosphate.**—*Martindale. Dose.*—A tablespoonful in a small cupful (4 to 5 ounces) of hot water. Similar to Milk and Glycerophosphate with addition of Catha. Forms an agreeable beverage. **Catha Cocoa Milk.** *Dose.*—1 tablespoonful, mixed with a small cupful of hot, nearly boiling, water, twice or thrice daily or as required.

Cascarilla (*B.P.* '14). Dried bark of *Croton Eluteria* (*Euphorbiaceæ*). Contains resin and 0·5 to 3% Volatile Oil, also the bitter principle cascarillin (best extracted by Acetone), together with resin and tannin. Aromatic tonic. **Infusum Cascarillæ,** 1 in boiling distilled water, 20. Infuse 15 minutes. **Tincture,** 1 in 5 Alcohol 70%. *Dose.*—½ to 1 drachm.

Cassiæ Pulpa (*B.P.* '14). *Dose.*—1 drachm to 2 ounces, from pods of *Cassia Fistula* Linné (*Leguminosæ*). Dried cylindrical brown fruit 20 mm. in diam., and 25 to 50 cm. long. Fr. Casse en batues. Mild aperient.

Castor, P. Austr. and Helv. Dried preputial follicles and secretions from the Beaver, *Castor Fiber* (*Rodentia*), in brown pieces. To contain not more than 40% insoluble in hot alcohol. Stimulant and antispasmodic. Is given in dysmenorrhœa as Tincture 1 in 20. *Dose.*—½ to 1 drachm, suspended in water, with Mucilage of Acacia, or the tincture may be evaporated and equivalent of these doses given in *capsule* form. *See* also Mistura Morphinæ et Phenazoni Composita.

Fr. Cx. describes the two commercial varieties Canadian and Russian.

Guttæ Castorei Compositæ containing Tincture of Castor 1 ounce, Compound Chloroform Tincture 4 drachms, Compound Tincture of Lavender 1 ounce, Spirit of Camphor 4 drachms, Spirit of Nitrous Ether 1 ounce. A teaspoonful in water for nervousness or sleeplessness.

Catechu (*B.P.* '14). *Syn.* Catechu Pallidum. Dried extract of leaves and young shoots of *Uncaria Gambier* (*Rubiaceæ*). Gambir, U.S., is the dried extract from *Ourouparia Gambir* (*Rubiaceæ*). Soluble in water to the extent of about 50% (U.S. 70%). Astringent in diarrhœa. *Dose.*—5 to 15 grains. **Tincture** 1 in 5, Alcohol 45% with Cinnamon 1 in 20. (Tinctura Gambir Composita, U.S.—*Average dose,* 1 drachm; 1 in 20 Diluted Alcohol with Cinnamon 1 in 40). **Trochiscus Catechu** contains 1 grain. For relaxed throat.

Catechu Nigrum. From Acacia Catechu. May be used in other parts of the Empire. '**Cutch**' is obtained from the heartwood of this tree.

Caulophyllin. *Dose.*—1 to 4 grains. Resinoid from root of *Caulophyllum thalictroides*—blue cohosh, pappoose, or squaw root. Contains an alkaloid, which is chemically Methylcytisine, $C_{12}H_{16}ON_2$, M.Pt. 137° C. (Cytisine occurs in Laburnum seeds and in the common gorse.) It also contains two glucosides, which are saponins.—F. B. Power and A. H. Salway, C.D. i./13,202. Has diuretic, diaphoretic, anthelmintic properties, emmenagogue, and antispasmodic. It appears to exert a direct influence on the uterus, Liquid Extract made with Alcohol 70% N.F. 1 = 1. *Dose.*—8 minims. Examination of the fruit of.—P.J. ii./08,550.

Liquor Caulophylli et Pulsatillæ B.P.C. *Dose.*—1 to 2 drachms Liquid Extract of Caulophyllum 25, Liquid Extract of Pulsatilla (1 = 1 with 60% Alcohol) 5, Glycerin 15, Alcohol 60% to 100.—P.J ii./10,393.

A sedative in dysmenorrhœa and uterine disorders.

★**Pulsa** (T.M. 481,423). *Dose.*—2 drachms diluted with 1 ounce of water thrice daily. When the period begins, increase to every two hours. A preparation containing Caulophyllum and Pulsatilla with carminatives, for the treatment of dysmenorrhœa. If taken for a few occasions, may effect a complete cure.

Cedri Ligni Oleum chiefly from *Juniperus Virginiana* (*Coniferæ*; family *Cupressineæ*) yields a stearoptene Cedrene Camphor (Cedrol) [$C_{15}H_{26}O$] and an oleoptene Cedrene $C_{15}H_{24}$, the odour of which is distinct and stronger than the Camphor, and taste finally peppery. Oil largely used in perfumery, also, in a thickened form by concentration *in vacuo*, in microscopical work with oil immersion lenses. **Paraffinum Liquidum** is also used for this. It is excellent for the purpose.—Rowntree, Jl. Path & Bact., 1908.

It is also the product of distillation of chip shavings and sawdust of pencil cedar (*J. americana* and *J. bermudiana*). It resinifies rapidly and is suggested as an addition to Paraffin for burns.—M. Hartog, L. i./17,475.

Cedrus Atlantica. The essential oil distilled from the wood. *Syn.* **Libanol.** Sp. Gr. 0·9517. $[\alpha]_D = +48°$ at 20° C. Soluble 1 in 3 to 4 of Alcohol 90%. 200 cases of blenorrhœa well treated with the oil instead of with Santal Wood Oil. Results equal in all respects to those obtained by other balsamic preparations.—F.N. 1909. Capsules contain 8 minims. *Dose.*—Up to 6 per diem *p.c.* Said to be useful in phthisis, bronchitis and skin affections. **Ointment** 25% with Vaselin basis.—N.S.D.

Cera Alba is Yellow Wax (*Cera Flava*) bleached from the honeycomb of *Apis Mellifica* (*Hymenoptera*), M.pt. about 61—64° C. To detect paraffin char with Sulphuric Acid, which completely oxides the wax—leaving the paraffin unchanged—this may then be extracted with ether. Paraffin lowers the M.pt.

Wax made from *flaxes* grown under various conditions is very similar to beeswax.—W. Honneyman, P.J. ii./26,157.

Cera Aseptica. Horsley's Wax. An aseptic wax for surgeons' use.—Yellow Wax 7, Carbolic Acid 1, Olive Oil 2. It is employed warm at a temperature such that its consistence is just sufficiently soft for easy manipulation. It is heated at temperature of boiling water 5 minutes and then poured into Saline or Mercuric Chloride solution at 105° F. from which it is used during the operation.—P. Sargent, B.M.J. ii./22,1200.

Oxycroceum Plaster. P. Helv. Yellow Wax 35, Colophony 25, Elemi 10, Galbanum 5, Myrrh 5, Resin 12, Crocus 1, Extract Rhatany 2. Modified formulæ are given in P. Edin. and P. Lond.

Cereus (Cactus) Grandiflorus (*Night-blooming Cereus*). *Syn.* **Cirio de Flores Mayores.** Ph. Mex. V. Liquid Extract (imported), 1=1. *Dose.*—1 to 10 minims. Tincture, fresh flowers and young stems 1, alcohol 4. *Dose.*—2 to 10, increased to 30 minims. Has been lauded in the past as a cardiac tonic, free from cumulative or narcotic action, but evidence of utility is doubtful. A proprietary 'Cactina Pellets' was in demand.

Cerii Oxalas. P. Jap., $Ce_2(C_2O_4)_3, 9H_2O = 706·644$. *Syn.* CER OXYDULOXALAT (German). $10H_2O$ is considered more correct than 9. *Dose.*—3 grains. A white insoluble crystalline powder. Incinerated it loses 53% of its weight. *Uses.*—In vomiting, particularly that of pregnancy, also in chronic diarrhœa, hysteria, epilepsy and migraine.

Cerii Sulphocarbolas. *Syn.* CERII PHENOL-SULPHONAS. *Dose.*—1 to 5 grains (0·06 to 0·3 Gm.) $Ce_2[C_6H_4(OH)SO_3]_6 = 1319·124$ (+Aq.).

A well-defined crystalline salt resembling the corresponding thorium body in appearance, suggested for therapeutic use by G. T. Morgan.

Cetaceum, Spermaceti. *Syn.* **Blanc de Baleine** FR. CX. White unctuous crystalline substance (M.pt. 46—50° C.), obtained from *Physeter Macrocephalus* and other species of whale, *e.g.*, *Hyperoodion rostratus.*—P.J. ii./13,68. The spermaceti from the latter is somewhat harder and quite equal in quality. Consists chiefly of Cetyl Palmitate, $C_{15}H_{31}CO.OC_{16}H_{33} = 480·512$. Soluble in chloroform 1 in 1½ and in Ether about 1 in 7, also in hot alcohol. Is contained in Cold Cream *q.v.* Unguentum Cetacei (*B.P.* 14). Now contains Liquid Paraffin in place of Benzoin and Almond Oil. Cetaceum injected warm (40° C.) the night before the operation on thin-walled cysts, after tapping and washing out with warm water.—B.M.J. i./06,154. A good addition to theobroma suppositories for hot climates.

Cetraria Islandica (*Discomycetes* or *Discolichenes*), **Iceland Moss** was at one time a 'throat remedy,' in form of decoction, jelly, or lozenge. Chemical data 18th Edn., p. 821. **Lichenoids** composed of it lubricate and soothe the mucous membrane of the throat. To be slowly dissolved in the mouth, suitable in inflammatory and excitable states of fauces and oropharynx, especially to speakers who suffer with dry mouth and throat. As a sialogogue they are excellent correctives in pyrosis.

Chaparro Amargosa. Bitter Bush. *Syn.* **Castela Nicholsoni**—a wild plant of South Texas and Mexico. Decoction a heaped teaspoon of twigs and leaves or root bark or decorticated root in 20 ozs. of water, boiled for 15 to 30 minutes. Enema also used as above. The drink as above taken thrice daily. *E. Histolytica* carriers treated. Results not very convincing.—S. Shepheard and D. G. Lillie, L. i./18,501. For this and other Mexican herbs, see E. M. Holmes, C & D., Jany. 8, 1921, p. 40. Contains Glucoside Castelin.—L. P. Borman, J.C.S. 1922, 121,969, Y.B.P. 22,101. Compares very favourably with Emetine in treatment of amœbic dysentery.—A. W. Sellards and L. Leiva, per Jl. Trop. Med., May 1/23,145; B.M.J.E. i./23,57.

Cheiranthus Cheiri (*Cruciferæ*, Wallflower).—This plant is stated to contain a Digitalis-like glucoside of such power that 0·0005 Gm. will produce systolic cardiac arrest in the frog—also an alkaloid cheirinin which acts on nerve centres and on muscles—U.S.D.

Chekan—The leaves of *Myrtus Chekan* are aromatic and expectorant; used in chronic coughs and bronchitis. *Dose*, of fluid extract, ½ to 3 drachms.

Chelidonium Majus.—GREATER CELANDINE.—The yellow milky juice is an old remedy for warts and opacities of the cornea. The freshly expressed juice preserved by ½% by volume of chloroform has been much used as a remedy for cancer, given internally in dose of 10 to 60 minims, and in some cases with striking results. A fluid extract (*Dose.*—10 to 30 minims) from the dried plant has been used for injection into diseased tissue, and, diluted, as a lotion. An alkaloid, Chelidonine $C_{20}H_{19}NO_5,H_2O$ = 371·176, has been isolated, melting at 135° C. The Hydrochloride and a Sulphate have been used as morphine substitutes in cancer. *Dose.*—3 grains twice a day.

Chenopodium Anthelminticum. *Linne* (*Chenopodiaceæ*). Contains a Volatile Oil, Official in U.S. X. *Average Dose.*—3 minims (Ph. Ned. V. has max. *pro die* 22 minims). For round worms 10 minims on sugar or in emulsion; has also been tried with good results in ascarides, giving 0·25 to 0·5 gram in sugar and water, and following this in an hour or two with a dose of castor oil. The treatment may be repeated after a day's interval. The sole constituent of the oil active against hookworms, is the organic peroxide *ascaridole* (60 to 70%), which is unstable.—T. A. Henry, C.D. Oct. 1921, p. 555; P.J. i./23,29; P.J. ii./21,349. Liquid Extract 1=1. *Dose.*—½ to 1 drachm.

Experiments showed that 1 in 10,000 of the Oil kills living ascarides, while Eucalyptol does not kill in several days in 1 in 2,000 Solution.—H. Brüning.

Chenopodium paralyses but does not kill round and hook-worms, which must be expelled by free purgation.—Dixon, p. 421.

Ankylostomiasis.—The oil is best taken in conjunction with Thymol at suitable intervals. *Dose.*—16 minims in two capsules followed by 2 ounces of Castor Oil in 4 hours. Thymol in doses of 5 grains.—Report on public health of Jamaica, C.D. January 13/17.

Uncinariasis Commission of the Orient. The Oil in small doses is more efficient than similar dose of Thymol.—L. i./21,235.

The maximum individual dose for hookworm appears to be 1 Cc., but three capsules, each containing 0·5 Cc., may be given at two-hourly intervals, followed three hours later by 1 ounce of Magnesium Sulphate.—L. i./22,1057.

The relation between malaria and hookworm. Oil is preferable to Thymol, though the after-effects—giddiness, deafness, burning in stomach and headache—are more pronounced.—Rockefeller Foundation Report.—T.D.B. 18/21,117.

Death due to blocking of larynx with ascarides in a child 22 months old following dose of ½ minim of Chenopodium Oil, Epsom Salts and saline enema. Ascarides were issuing from the mouth 10 hours after death.—R. F. C. Caldwell, per T. D. B. 19/22,657. See also Jl. A.M.A. ii./25,234.

Signs of collapse after Chenopodium treated with 1½ Cc. Pituitrin intramuscularly.—D. C. Richards, per. Jl. Trop. Med., Feb. 15/23,69.

Need for campaigns. Chenopodium Oil is not well spoken of.—C. Lane, B.M.J. i./23,551.

Ankylostomiasis in French Guiana. Of 200 cases treated 83·4% were cured by Chenopodium Oil 4 Cc. with Castor Oil.—E. L. Peyre, per Jl. Trop. Med., July 2/23,237.

Dangers of Oil of Chenopodium. Many cases of poisoning recorded—some fatal. No other drug should be given with the anthelmintic.—B.M.J.E.i./24,57.

20,000 worm cases treated by a fresh mixture of 1 part with 7 of Carbon Tetrachloride.—Jl. Trop. Med., Feb. 1/24,31.

Death from the oil given three times a day in the usual doses. The secret of its correct use is to prevent absorption. Give in *one* sufficiently large dose and expel from the intestines by aperients. Repeat after 2 weeks.—B.M.J.E. ii./24,86.

Fatality after taking 10 Gm. within a week.—per Jl. A.M.A., i./26,1175.

Chicle, the basis of **American chewing gum,** is stated to be the juice of *Achras sapota*, a tree found in Southern Mexico, British Honduras and in Central and Northern South America. It is obtained, like rubber latex, by tapping, and the milky fluid is boiled until it coagulates and is then pressed.—C. & D.

i./25,802. Personally, we have been informed that one of the Spurges is largely collected in Australasia for the purpose of making chewing gum.

Chirata.—*Swertia Chirata* (*Gentianaceæ*). Entire plant. Bitter tonic given in indigestion for anorexia and torpid liver with constipation. *Dose* of powder 20 grains. Fluidextract, U.S. VIII. *Average dose.*—15 minims. Tincture (*B.P.* '14) 1 in 10 Alcohol 60%. *Dose.*—½ to 1 drachm. Might be made with Alcohol 45%—P.J. ii./09,142. Infusion 1 in 20. *Dose.*—½ to 1 ounce.

Japanese Chiretta. Swertia Chinensis is more bitter than the official.—V. Cofman B.P. Conf. 1919.

Chlorophyll.—The green colouring matter of plants extracted first by ether, then alcohol—in which latter the chlorophyll is soluble, leaving the waxy matter behind, or it can be produced by Acetone extraction. Supplied commercially in solid extract and liquid form. Oil soluble and water soluble varieties are available.

Chondrus Crispus (*Gigartinaceæ*), Irish Moss. **Carrageen, Ph. Ned. V., P. Belg.** Employed as decoction, Moss ½ ounce, Water 1½ pints boiled down to 1 pint. Flavoured with a little sugar and lemon juice. Demulcent and nutritive. Contains about 60% Carbohydrate, 7% Protein, and 10% more or less of ash.

Cicuta Virosa (*Umbelliferæ*), Water Hemlock, Cowbane, or Wild Parsley . contains Cicutoxin, a substance giving rise to convulsions by action on the spinal medulla. Poisonous to some animals, though eaten by sheep without killing them. Cases of poisoning.—G. A. Stutterheim, Y.B.P. 1919, 179.

Cimicifugæ Rhizoma (B.P. 1898), U.S. *Dose.*—15 grains. The rhizome and rootlets of *Cimicifuga racemosa, Actæa racemosa* (Linn.), black snakeroot or black cohosh. Indigenous to the United States and Canada. Contains the resinoid Cimicifugin, also a small quantity of Isoferulic (hesperetic) Acid and a trace of an alkaloidal body.—P.J. ii./09,154; ii./10,142. *Dose.*—1 to 6 grains in pill. Useful in chronic rheumatism where one part of a tendon, muscle, or articulation is painful, or where the disease is traceable to previous affection; also in lumbago, sciatica, chorea, and amenorrhœa; also as a tonic and antispasmodic and to excite contraction of the uterus(?) **Liquid Extract** (B.P. 1898). 1 = 1 of Cimicifuga exhausted with 90% alcohol. *Dose.*—5 to 30 minims. **Fluidextract U.S.X.** 1 = 1. *Average Dose.*—15 minims. **Tincture** (B.P. 1898). *Syn.* TINCTURA ACTÆÆ. 1 in 10 of 60% alcohol *Dose.*—30 to 60 minims or 5 minims every hour. *Flavoring*, Syl Vanillæ, Syl Rosæ; Syrupus Aromaticus.

In rheumatoid arthritis Sydney Ringer recommended 15 minims of tincture with 5 minims of tincture of gelsemium thrice a day.—Pr., Nov., 1910

Snake Root, in India, is termed *bo boni*, has the appearance of dried ginger, and is white in section. It is eaten in pieces size of a pea after poisoning. The snake charmers use it to stupefy snakes. (This Indian snake root has evidently no connection with Cimicifuga.) 'Snake stone' is said to be obtained from a frog,—it is also used in India after poisoning.—It is stated to "cure."—For details see L. i./11,892,1535.

In chorea Liquid Extract of Cimicifuga from fresh herb in ½ to 3 m. doses for a child 12 years. Liquid Extract of Gelsemium, 1/3 to 1 minim may be given in conjunction, as also Liquid Extract of Scutellaria laterifolia—a reliable sedative. 2 minims for a dose for a child. Should insomnia be present give Hyoscyamus (not mixed with the above)—3 to 4 minims of Tincture in water every half hour, beginning late afternoon until sleep occurs. —Pres., July, 1913, 244.

Cocculus diversifolius *D.C.* contains an alkaloid, Kukoline, which increases reflexes, contracts the pupils, hastens respiration, initiates cramps with eventual paralysis by central action, and paralyses all muscles in varying degrees. Another alkaloid, Diversine, increases reflex irritability, paralyses the heart muscle directly, contracts peripheral vessels (large doses cause dilatation), reduces intestinal tonus; in small doses it excites uterine activity, but large doses paralyse this muscle.—Per Jl. A.M.A. ii./25,706.

Cocillana (*Guarea Rusbyi*). The bark of a South American plant, stated to equal ipecacuanha in expectorant properties and to be, in addition, tonic and laxative. Ⓟ Syrup of Cocillana Compound a specialty. Each drachm containing Tincture of Cocillana 5 minims, Tincture of Euphorbia Pilulifera 15 minims, Syrup of Wild Lettuce 15 minims, Fluid-Extract of Squill ¼ minim, Fluid-Extract Senega ¼ minim, Tartrated Antimony $\frac{1}{184}$ grain, Cascarin 1 grain, Heroin Hydrochloride $\frac{1}{24}$ grain, Menthol $\frac{1}{100}$ grain. *Dose.*—½ to 1 drachm.

Cochlearia Armoracia, fresh Horseradish Root. Sialogogue, stomachic, and slightly diaphoretic. Yields pungent volatile oil on moistening or rasping. Used as **Spiritus Armoraciæ Compositus** (*B.P.* '14).

Collinsonia Canadensis.—The root of this, commonly known as stone-root or knob-root, Heal-all, Hardhack, in America, has been employed in gravel and other urinary affections. Is an antispasmodic in flatulent, infantile, and biliary colic, and locally in lax conditions of the uvula, pharynx, and vocal cords. Tincture, 1 in 10 of alcohol 60%. *Dose.*—½ to 2 drachms. Liquid Extract, 1 in 1. *Dose.*—15 to 30 minims. Suppositories containing 20 to 30 grains of the powder are also used. Has also been employed in cancer of stomach and cystitis. The early colonists in America probably used the fresh root for 'the liver.' The tincture is said to be really useful—something of the Podophyllum effect without griping. Under the name **Helalin**, Liquid Extracts are prepared containing, in addition, Cascara and Pepsin as hepatic stimulants. *Dose* of each 1 drachm.

Condurango Cortex, P.G. VI.—*Dose*, in powder, 15 to 60 grains (1 to 4 Gm.). The stem bark probably of *Marsdenia cundurango*, *Reichenbach fil.* from Peru. Is bitter and acrid. Alterative, a supposed specific for cancer, syphilis, and dyspepsia, and with hydrochloric acid in enuresis, is a stomachic and stimulant. **Extractum Liquidum**, B.P.C., 1901. 1 = 1 of Bark in 60 powder exhausted with 60% alcohol. *Dose.*—10 to 60 minims. Alcohol 45% is a good menstruum.—P.J. i./01,747. **Infusum**, 1 in 20 of hot water. *Dose.*— ½ to 2 ounces (15 to 60 Cc.). **Vinum**, P.G. VI. Liquid Extract of Condurango 10, (1=1 made with alcohol 1 and water 3), Aromatic Tincture 1, Sugar 9, Sherry 80. (**Aromatic Tincture** P.G. VI. is Cinnamon 5, Ginger 2, Galangal (Alpinia Officinarum) 1, Cloves 1, Cardamoms 1, Dilute Spirit 50). *Dose.*—½ to 1 ounce (15 to 30 Cc.). **Tincture** 1 in 10 Alcohol 60%.

Convallaria Majalis (*Liliaceæ*). LILY OF THE VALLEY.—(Entire plant.) Two glucosides have been obtained from the plant: **Convallarin**, a purgative without cardiac action (*Dose.*—3 to 4 grains); and **Convallamarin** (*Dose.*—½ to 2 grains). Convallamarin is a cardiac stimulant and diuretic and has been used in preventing arrest of circulation in chloroform narcosis.

Its action is so feeble as to be almost of no value in medicine. **Tincture**, B.P.C. *Dose.*—5 to 20 minims, 1 of flowers in 8 of Alcohol 60%. The drug is an old remedy for dropsy. **Extract** (Aqueous). *Dose.*—2 to 8 grains, in pill. **Fluid-Extract.** *Dose.*—8 minims. 1=1 of dried rhizome and roots. The flowers are stated to be more active than the root. **Glyco-Gelatin Pastils** contain 2 minims of tincture. These dissolve slowly and are hence useful for prolonged action.

Coriandri Fructus. *Dose.*—20 to 60 grains. Dried ripe fruit, *Coriandrum sativum* (*Umbelliferæ*). Aromatic and carminative. **Oleum Coriandri.** *Dose.*—½ to 3 minims, Sp. Gr. 0·87 to 0·885. Is contained in preparations of rhubarb and senna to prevent griping.

Aqua Carminativa P. Austr.—Peppermint Leaves, Roman Chamomile Flowers, Fennel Fruit, Coriander Fruit, Caraway, Orange Peel, of each 15. Distil to produce 1,000. A pleasantly flavoured aromatic water.

Coronilla varia.—An aqueous extract of the leaves and flowering tops is used in cardiac affections; does not derange digestive functions. *Dose of extract* is 1½ grains (0·1 Gm.) three or four times daily. Tincture 1 in 8, by percolation. *Dose.*—30 to 60 minims.

Costus. The root of this plant (about 5 ft. high), of which the Kashmir Government have the monopoly, contains a small amount of Essential Oil (we obtained 0·015%). In powder it is used for preserving furs, etc., from moth. The oil is used as a basis for perfumes: the powder for sachets.

Crocus, Saffron (B P., 1898). The dried stigmas and tops of the styles of *Crocus sativus* (*Iridaceæ*) Linn. Every filament should give a blue colour on placing in Sulphuric Acid. It is a curious old delusion that saffron tends to bring out the rash of measles.

Cubeba (*B.P.* '14). *Dose.*—30 to 60 grains in cachets. The dried unripe full-grown fruit of *Piper Cubeba* (*Piperaceæ*). The genuine—imported from Java—give a crimson colour with sulphuric acid, and are free from mace-like taste and odour. **Cubeb Cigarettes** are useful for catarrh and excessive bronchial secretion. It is sometimes added to Ferrier's Snuff, *q.v.* **Oleum Cubebæ, U.S. IX.** *Dose.*—5 to 20 minims. Colourless, pale green or greenish ellow oil, with camphoraceous odour and characteristic taste. Soluble in 20 in alcohol 90%. At least 60% should distil between 250° and 280° C. **apsules** contain 10 minims. For combinations *v.* Oleum Santali. Used in ladder and urethral affections. **Suppositoria** 10 grains each for astringent ffect. **Tinctura Cubebæ,** 1 in 5 Alcohol (90%) (*B.P.* '14). *Dose.*—$\frac{1}{2}$ to 1 rachm. In chronic bronchitis as an expectorant. *Flavoring.*—Syl Aurantii mari, Glyl Pini. **Oleo-resina Cubebæ** (B.P. 1885). *Dose.*—5 to 30 minims. **rochisci Cubebæ,** T. H. Marked 'C.B.' $\frac{1}{2}$ grain each (U.S. IX. $\frac{1}{3}$ grain) with ruit paste. *Dose.*—1 every 3 or 4 hours. **Vapor Cubebæ cum Limone,** .H. Cubeb Oil $\frac{1}{2}$ drachm, Oil of Lemon 10 minims, Light Magnesium arbonate 20 grains, Water to 1 ounce. Has stimulating effect in chronic ronchitis.

Cucumis (*Sativus*).—**Cucumber.**—The juice of the fruit is in French Codex o prepare **Ungentum Cucumeris**—*Syn.*—Fr. POMMADE AUX CONCOMBRES: ucumber Juice 1,200, Lard 1,000, Veal Suet 600, Balsam of Tolu in Alcohol 0%. *q.s.*, 2, Rose Water 10. A cooling ointment, used like cold cream.

Cucurbitæ Semina Præparatæ. MELON PUMPKIN SEEDS (*B.P.* '14). *Dose.* —3 to 4 oz. bruised with water or milk. Fresh ripe seeds of *C. maxima Cucurbitaceæ*), deprived of testa and tegmen. Anthelmintic.—Give first a aline purge and afterwards Castor Oil.

P1 **Curara.** *Syn.* CURARE, OURARI, URARI, WOURARA, WOURALI. *Dose* —$\frac{1}{20}$ to $\frac{1}{2}$ grain. The South American Indian arrow-poison, produced from pecies of *Strychnos* and other plants (*Loganiaceæ*). A blackish-brown dry extract, with bitter taste; contains some resin, but is nearly all soluble in water.

Two varieties of Curare are said to be made, one from the fresh bark of the ranches of *S. Gubleri*, strong (for larger animals) and the other (weak, for mall birds, &c.), from *S. toxifera.*

Curare is an extract of different plants of which the active principle is derived rom the bark of various kinds of a Liana-like South American *Strychnos*, ommercial "Calabash" Curare is derived from *S. Toxifera*: "Pot" Curare rom *S. Castelnaei* together with *Cocculus Toxiferus* (*Menispermaceæ*), while 'Tube" Curare is from unknown plants.—B.M.J. ii./11,218.

Use of Woorali as arrow poison in South America.—Sir J. Bland-Sutton, .M.J. ii./22,932.

Antidotes.—(There is no tetanus—poisoning is not like that of Strychnine.) rtificial Respiration, Stimulants—brandy, hot gin, sal volatile freely. Ligaure if wound; this may be cautiously loosened and tightened again to admit little of the poison at a time to the system. Wash the wound.—Murrell.

This and Curarine have been **given hypodermically in hydrophobia and for trychnine poisoning.** For tetanus, a case cured.—L. ii./04,831.

Tetanus treated by Curare after antitoxin had failed. Subcutaneous njections of two, increased daily to five mgr. An attempt to raise the dose o six mgr. led to transient paralysis of the respiratory muscles, causing yspnœa. The dose of 5 mgr. was continued. The convulsions which someimes occurred every hour subsided. Patient received 63 mgr. in 14 days.— .M.J.E. i./21,93.

P1 **Hypodermic Injection.** 10%. *Dose.*—1 to 6 minims. Use recently oiled distilled water, *q.s.*, to form a thin paste, transfer to a funnel plugged vith absorbent wool, and gradually add water *q.s.* **P1** **Hypodermic Tablets** ontain $\frac{1}{12}$ grain of Curare.

Mason and Wheeldon murder conspiracy against the Prime Minister and Ir. A. Henderson, March, 1917. Penal servitude inflictions. See Edn. VIII., p. 825. It was stated that no fatal case has been recorded in literature f curare poisoning.

P1 **Curarina.** $C_{19}H_{26}N_2O = 298{\cdot}224$. Another formula:—$C_{18}H_{35}N$. *ose.*—$\frac{1}{400}$ to $\frac{1}{40}$ grain (?). This, the active principle of Curare, is a powerful oison, in yellowish powder soluble in water and alcohol.

Cuspariæ Cortex.—The dried bark of *C. Febrifuga.* *Syn.* Angostura ark. Stimulant and tonic. In diarrhœa, dysentery and dyspepsia much nployed in South America and West Indies. *Dose* of powdered bark, 10 to) grains. The Bark is stated to contain Cusparine $C_{20}H_{19}NO_2$, Cuspareine $_{18}H_{19}NO_2$, and Galipoidine C[illegible]H_1[illegible]NO[illegible].

Cydoniæ Vulgaris Semina (Quince Seeds). Resemble apple pips. They ontain in the epithelium a gum—Cydonin—about 20% of the weight of the ry seeds. One part of the seeds, with 40 of water, yields a thick jelly used as ucilaginous agent in toilet preparations. **Mucilage** of quince is official in some Pharmacopœias, the strength varying from 1 in 25 in the Austr., to 1 in 100 in the Belg. The strength of 1 in 50 of cold water or rose-water is the one generally preferred. Macerate with the cold water for from ½ to 2 hours, and strain without expression. **Decoction** of quince is made by boiling for ten minutes. Glycerin, Carbolic Acid, Boric Acid, Salicylic Acid, Sodium Benzoate, or other preservative is necessary. Such 'Creams' are Medicated with Witch Hazel, Borax, or Tincture of Benzoin. **Irish Moss Decoction,** 1 in 30 is similarly employed.

Cynoglossum Officinalis, *Hound's tongue* (*Boraginaceæ*). Has demulcent properties. Often acts similarly to Curare.—L. i./06,974.

Cyperus Rotundus (*Cyperaceæ*), SINGHALESE **Kalandura.** A rushlike plant, carminative, stomachic, and hepatic stimulant. A popular remedy in Ceylon. An infusion of the tubers of the plant mostly employed. Increases flow of saliva when chewed. On the intestinal membrane it is astringent and styptic. The natives use it for epistaxis. In dysentery, bronchitis, tonsillitis, and all forms of fever, both alone and in combination with other drugs.—B.M.J. i./07,327. We found the root to contain a considerable quantity of Volatile Oil of odour strongly resembling Sandal Wood Oil. **Known in the Sudan as Seid Oil. Examination.—Joseph & Whitfield,** J.S.C.I., 1922,41,172. It is contained in Syr. Aegle Marmelos Co. **Liquid Extract.** *Dose.*—15 to 60 minims 1=1 prepared by Alcohol Extraction. This preparation brings out the Santal-like smelling constituent. *Flavoring.*—Syl Pini; Extractum Glycyrrhizæ Liquidum. **Gelatin Capsules** contain 5 minims of Liquid Extract.

Cypress Oil. The oil of various species has been substituted intentionally or carelessly, *e.g.*, *C. Lusitanica* gives a larger percentage of oil and is cheaper —E. M. Holmes, P.J. i./23,107. It is employed to give persistence in perfumery.—W. A. Poucher, *ibid.* 181.

P1 Cytisine, $C_{11}H_{14}N_2O = 190{\cdot}128$. *Syn.* Ulexine. Is an alkaloid obtained from *Cytisus Laburnum*. It is also present in *Ulex europæus*—the common furze. **P1**Cytisine Hydrobromide, a freely soluble salt, *dose*, $\frac{1}{20}$ to ⅕ grain, has diuretic properties. It benumbs the tongue. The Glucoside contained in small dose produces hyper-excitability. Mild doses feeble cardiac tonic—diuretic. **Poisoning by Laburnum Seeds. Expectant treatment and recovery.—B.M.J. ii./17,676. Lice have been killed with cytisine.**

Damiana. *Syn.* "BOHADSCHIA" (APHRODISIACA), HYSTERIONICA, BAYLAHUEN. The leaves of *Turnera diffusa var. aphrodisiaca* and other species (*Turneraceæ*) are recommended in the United States as possessing aphrodisiac properties. Useful in melancholia. Said to be tonic and diuretic. Contains bitter substances, resins, and volatile oil.

Liquid Extract of Damiana, 1=1, made with alcohol 60%. *Dose.*—½ to 1 drachm. *Flavoring.*—Glyl Pini, Syl Rosæ, Syl Lavandulæ. **Extract** *Dose.*—2 to 10 grains. **Capsules** are each equivalent to 30 minims of the liquid extract. Ⓟ**Mistura Damianæ Composita.** *Dose.*—1 to 2 drachms. Sodium Hypophosphite 5 grains, Calcium Hypophosphite 5 grains, Liquid Extract of Damiana ½ drachm, Liquid Extract of Nux Vomica 2 minims, Chloroform Water to 2 drachms. Ⓟ**Pilula Damianæ Composita.** Extract of Damiana 2, Phosphorus $\frac{1}{100}$, Extract of Nux Vomica ⅛. Liquorice Powder *q.s.* to 3⅙ grains. *Dose.*—One, two, or three times a day.

Dammar as used in this country for varnish making and for microscopic work is the East Indian Dammar from *D. Orientalis.*—It occurs in small yellow resinous pieces somewhat larger than wheat. It is partially soluble in alcohol and soluble in chloroform.

Divi-Divi. A dye extracted from the seed pod of a small tree growing wild in the peninsula of Goajira (Venezuela).

Dragon's Blood.—Resin from *Dæmonorops Draco* is the chief ingredient in mahogany varnishes. Distinguishes Benzine from Benzol, *cf.* Benzol.

Drosera rotundifolia.—The leaves of Sundew (FR. CX. entire plant), yield a greenish-brown, odorous, very acrid resin, Glucose, Citric Acid, and probably Malic Acid. and a ferment which converts Albumen into Peptone. Have been recommended for chronic bronchitis, asthma and to ease the cough of phthisis. Tincture, 1 in 10 of proof spirit. *Dose.*—1 to 10 minims. FR. CX. 1 in 5 alcohol 60%. In pertussis, small doses of the 1 in 10 Tincture.

Whooping cough, paroxysmal stage. Drosera *not* found specific. In doses beyond *min. iii ter in die* of the 10% tincture it is irritant.—B.M.J. ii./25,1222.

Echium Vulgare (*Boraginaceæ*) **Vipers' bugloss** has some relationship to Curare in action, causes same symptoms as alkanet *q.v.* with more hyperæsthesia and greater weakness of the muscles.

Elaterium (B.P. 1898). *Dose.*—$\frac{1}{10}$ to ½ grain. The dried sediment from the juice of fruit of *Ecballium Elaterium* (*Cucurbitaceæ*). A powerful hydragogue cathartic, useful in renal or cardiac disease complicated with dropsy. In Cyprus we understand the peasants take the fresh juice of the fruits by the nostrils for jaundice.—Ph. Notes. **Pilula Elaterii Composita,** St. Bart.'s H. Elaterium ¼ grain, Compound Extract of Colocyntn 2 grains, Calomel 1½ grains, Capsicum ½ grain. **Tinctura Elaterii Composita.** *Dose.*—10 to 30 minims. Elaterium in powder 1, Chloroform 50, macerate 2 days, then add Alcohol (90%) 200, and Compound Tincture of Cardamoms 250, macerate 5 days more and filter. Is more active than a corresponding dose of the powder.

Elaterinum. (B.P., 1898, U.S.). *Syn.* MOMORDICIN. $C_{20}H_{28}O_5 = 348{\cdot}224$. *Dose.*—$\frac{1}{40}$ to $\frac{1}{10}$ grain. The crystalline neutral active principle (to extent of at least 20%) of Elaterium, insoluble in water, soluble in chloroform (about 1 in 12) and sparingly in alcohol. For the Chemistry of Elaterin, see Edn. XV., p. 815. **Pulvis Elaterini Compositus** (B.P., 1898). Elaterin 1, Milk Sugar 39. *Dose.*—1 to 4 grains.

Embelia (*B.P.* '14). *Dose.*—1 to 4 drachms. Dried fruit of *E. ribes* and *E. robusta* (*Myrsinaceæ*). Anthelmintic, especially for tapeworm.

Emblicæ Fructus. Black or Chebulic Myrobalans. Terminalia Chebula (*Combretaceæ*), is *B.P.* '14. The dose of the powder ranges from a few grains to 2 dr. Dried mesocarp of the fruit is employed—astringent in action. It is a valuable styptic. Purgative in large doses (½ to 2 dr.), but may constipate after purging. Reduces albumin and blood in the urine, and is said to have similar action on glucose. The natives employ it in perineal injuries caused during child-birth, eczematous sores and prolapsus ani—as gargle and dentifrice in spongy gums, and as injection in diarrhœa, internally stomachic and cholagogue. **Unguentum,** *B.P.* '14 (and P1 CUM OPIO, *B.P.* '14), are equivalent to gall ointment (and with Opium).

The fruits of the various species of *Terminalia* (five principal varieties) are largely used in tanning. The kernels contain 36% to 37% of a non-drying oil.

P1 **Ephedrine** $C_{10}H_{15}ON$. An alkaloid from the Chinese drug Ma Huang, commonly stated to be *Ephedra Vulgaris* var. *Helvetica*, known 5,000 years ago and sold now in Peking drug shops in small brownish green sticks. The constitution of the alkaloid is $C_6H_5.OH.CH.CH.CH_3.NH.CH_3$. (J.C.S.A. i./20,396). Content about 1%. Physiological effects are similar to Adrenalin but more prolonged, the outstanding effect being circulatory stimulation. It has mydriatic powers, but it is not used clinically for that effect. *Asthma* has been much treated by means of its salts.

Ephedrine, studies of—K. K. Chen and C. F. Schmidt, Jl. Ph. and Exp. Ther., Vol. XXIV, '24,339; Feb. '26,61; July '26,64; B.M.J. ii./27,593.

Ephedra varieties and alkaloid content.—P.J. ii./27,118.

P1 **Ephedrinæ Hydrochloridum** $C_{10}H_{15}ON.HCl$.—*Dose* (Adult) ½ to 2 grains either *per os*, hypodermically, intramuscularly or intravenously. (*Caution*: 1 grain has been known to produce slight toxic phenomena.)

P1 **Ephedrine Hydrochloride Tablets,** ½ grain (0·03 Gm.) are made for oral or hypodermic use in asthma, hay fever, Addison's disease, and for shrinking the turbinated bodies.

P1 **Ephedrinæ Sulphas.** *Syn.* Fedrin, Lilly $(C_{10}H_{15}ON)_2H_2SO_4$. *Dose.*—Similar to that of the hydrochloride. The max. daily dose is stated to be 4½ grains. This salt, which is also readily soluble in water, has M.Pt. 235 to 236° C. It is not decomposed on standing, sterilisation or exposure to light. **Fedrin, Lilly Pulvules** (filled capsules) are available in U.S.A., containing ⅜ and ¾ grain, also *Fedrin Solution* 3% for topical use.

Doses of 50 to 125 mgr. orally or subcutaneously, raise systolic and diastolic blood pressure, and decrease pulse rate for several hours, also stimulate heart action and tend to increase output of urine. Cause prompt contraction, lasting over three hours, when applied to nasal mucous membrane, with no local irritant effect. Suggested for asthma and acute circulatory depression, and in management of certain congestive nasal conditions.—T. G. Miller, Am. Jl. Med. Sci., per Jl. A.M.A. ii./25,1159.

Animal experiments with Ephedrine Sulphate seemed to indicate no cumulative effects. The M.L.D. when given *per os* to rabbits was found to be 0·59Gm. per kilo.—K. K. Chen., Jl. Pharm. and Exp. Ther., Feb. '26,61–92.

Hay fever treated with 60 mgr. (1 grain) doses *per os* in capsules—5 to 10 capsules per week. Toleration varied. Worthy of trial in coryza.—Am. Jl. Med. Sci. Oct. '26, per P.J. ii./27,10.

A diaphoretic, analeptic and sedative in cough for 1,000 years in China. Bronchial asthma treated by 5 mgr. thrice daily.—Jansen, per P.J. ii./27,10.

10 mgr. of Ephedrine subcutaneously may cause gangrene and necrosis at the site of injection, but smaller doses do not. Adrenalin is said to be two and a half times as efficient as Ephedrine.—J. E. Nadler, P.J. ii./27,73; see also *ibid.* 94, 176 (effect on blood sugar intravenously).

Leprosy. *Per os* relieves nerve pains: more lasting and efficient than Adrenalin injections.—E. Muir, I.M.G., Apl. 28, '28, 198.

Further refs.: Can. Med. Ass. Jl. 1926, XVI, 422; Jl. A.M.A. '26, Vol. 87, No. 26, p. 2185; Pres., Jan. '27,9.

✱ **Ephetonin** (T.M. 476,189) is stated to be synthetic Ephedrine.

Equisetum Arvense P. Austr. 'Cat's Tail.' The sterile shoots contain Equisetic Acid, said to be identical with Aconitic Acid.

Erigeron Canadense.—Fleabane. The oil distilled from the herb. *Dose.*—5 to 30 minims. Sp. Gr. 0·850 to 0·890. Capsules contain 5 minims, and a Liquid Extract of the leaves is prepared. *Dose.*—30 to 60 minims. Oil has been thought to have astringent and hæmostatic properties, especially in uterine, urinary and nephritic affections, dysuria, strangury. The fresh herb may yield 0·5% of oil, which on keeping will deposit resin and crystals. The only known constituents are Limonene and Terpineol.—Finnemore.

Erodium Cicutarium. Storks-bill (Geraniaceæ). **Liquid Extract.** *Dose,* 15 minims three or four times daily, 1=1, has been used in Holland with good result instead of Hydrastis. Macerate 100 of the powdered herb in 60 of a mixture of Alcohol 90% and water *p. eq.* for 24 hours. Then percolate until 80 of percolate are secured. Reserve this and percolate to exhaustion. Evaporate this to 20 and add to the reserve.—P. Van der Wielen.

Eryngium Maritimum. The Sea Holly. Decoction of fresh leaves, 1 in 10, preserved with 20 % Alcohol. *Dose.*—A wineglassful three times a day. For kidney or bladder trouble. The root of *E. campestre* is used similarly.

Erysimum. *Syn.* **Sysimbrium Officinale** Fr. Cx. *Syn.* Herbe aux Chantres. An old remedy for hoarseness. **Sirop d'Erysimum** a proprietary. *Dose.*—½ ounce thrice daily, in a teacup of infusion of the same plant, is given in catarrhal laryngitis.

Esparto Grass from Spain and N. Africa is a source of wood pulp in paper making. It is boiled with Caustic Soda to dissolve away the fleshy parts, the fibrovascular tissue of the nature of wood being left. It is then bleached. The trade in the grass amounts to 200,000 tons per annum. A by-product of great value in the grass amounting to 3½ % is a wax and oil mixture.—C. F. Cross, C.D. i./17,252.

Eucalypti Gummi (B.P. '98). *Syn,* **Kino Eucalypti** (*B.P.* '14). Red Gum. *Dose.*—5 to 20 grains in powder.

An exudation from *E. rostrata* (*Myrtaceæ*), and other species. 80 to 90% of it is soluble in cold water, almost entirely soluble in Alcohol (90%). Used in diarrhœa, and relaxed throats, and as astringent generally.

To be distinguished from the common Australian or Botany Bay kino, said to be from *E. resinifera* (*Myrtaceæ*). The latter is very resinous and little soluble in water; was included as **Kino Eucalypti in I.C. Add.**

Decoction. *Dose.*—2 to 4 drachms, 1 in 40. Boil and strain. Used as gargle and for diarrhœa. **Liquid Extract, B.P.C.** *Dose.*—30 to 60 minims in water. Eucalyptus Gum 25, Distilled Water 65. Dissolve by constant shaking, strain and add Alcohol 90% 10 and water *q.s.* to 100. A styptic. **Insufflation** 50% in starch. A powerful astringent in hæmorrhage and relaxed conditions of the larynx and trachea. **Suppository,** 5 grains in each with cacao butter (pressed dry). **Syrup.** Liquid Extract of Eucalyptus Gum 5, Sugar 3. *Dose* —30 to 60 minims **Tincture.** 1 in Alcohol (90%) 4 by maceration. *Dose.*—20 to 40 minims. 1 to 7 of water as a gargle.

External hæmorrhage of any form could probably be stopped by local use of this tincture combined with internal use of Calcium Chloride. It is exceedingly useful in dental work, and to cuts caused by accidental injury. **Trochisci Kino Eucalypti** (*B.P.* '14). Contain 1 grain in each.

rochisci Eucalypti Compositi.

Potassium Chlorate 2 grains, Cubeb Powder ¼ grain. Eucalyptus Gum 1 rain with fruit paste, and are marked C.E. Useful in congested and relaxed iroats, especially when mucous secretion is arrested.

Eugenol, U.S.—Eugenic Acid, $C_6H_3(OH).(OCH_3).C_3H_5$, 4 : 3 : 1 = 164·096. colourless oily liquid (B.Pt. 251° to 253° C.), darkening on exposure. ; is the chief constituent found in oil of cloves. It has a strong clove odour. nd is a powerful antiseptic and antiputrescent. Is employed by dentists. auses reduced sensibility of mucous membrane, but not complete anæsthesia. seful with wool fat in eczema.

Eupatorium. *Average dose.* 30 grains. Dried leaves and flowering tops of *upatorium perfoliatum* (*Compositæ*) Linné. Thoroughwort or Indian Sage. onic and diaphoretic; in large doses, emetic and aperient. Employed in yspepsia, and the infusion (1 in 20. *Dose.*—1 to 4 ounces or more) has been ven in tapeworm. **Liquid extract,** 1 = 1. *Dose.*—30 minims.

Euphorbia Peplus (*Euphorbiaceæ*). PETTY SPURGE, DEVIL'S MILK.

In cases of dyspnœa whether of pulmonary or pneumo-gastric origin. Modi-es secretion in asthma and suppresses attacks. The fresh plant has an crid juice, which, when dried, imparts its virtues both to water and alcohol. **ecoction.** 45 grains to the pint. *Dose.*—1 teacupful (diluted if preferred) 3 r 4 times daily, preferably between meals. Flavoured *e.g.*, with Glyl Lavan-ulæ or Syl Rosæ. **Extract.** *Dose.*—7½ to 30 grains. **Tincture.** (1 in 5 y 45% Alcohol.) *Dose.*—30 to 60 minims during the day.

Euphorbia Pilulifera. (*Euphorbiaceæ.*) Australian Snake Weed or Cat's air. For asthma, bronchial affections, paroxysmal dyspnœa, laryngeal pasm, whooping-cough, angina pectoris, in coryza, and hay fever. Contains allic Acid, Quercetin and a Phenolic substance $C_{28}H_{18}O_{15}$; also a glucoside nd a minute amount of alkaloid. **Extract** (Aqueous). *Dose.*—½ to 1½ grains. **incture.** *Dose.*—10 to 30 minims. 1 in 5 of alcohol 60%.

Protozoal parasites of the genus herpetomona are widespread—the flagel-ate form is found in many insects also in the vegetable kingdom—in the tex of sprig of Euphorbia—very like the leishmania flagellate. A flagellate ound in an edible plant such as lettuce may be a source of infection to man. -A. W. Sheen, Pr. Feb. 21, p. 85.

E. Pilulifera was first introduced by Carr-Boyd of Townsville, Queensland, 1880 as an asthma remedy and became known as the 'Queensland Asthma erb.' The plant that has passed under the name *Euphorbia Pilulifera* inn, is really *E. hirta*, Linn. This alteration is awkward, but the difficulty an be lessened by using the name *Euphorbia Pilulifera Jacquin* as a synonym. -E. M. Holmes, P.J. i./23,162.

Fevillea cordifolia. N.O. *Cucurbitacæ.* The Segra Plant (Snake ine). The seeds, termed locally "Antidote Cocoon," are used as an anti-ote against snake and other poisons in Jamaica.

Ficus Carica.—The acrid sap of the common fig produces dermatitis on ne skin. In Southern Europe the Sap is in use as a counter-irritant or vesi-ant. Occasionally it gives rise to ulceration.

Fœniculi Fructus. Fennel. Dried ripe fruit of *Fœniculum vulgare N.O., mbelliferæ* (cultivated) (*B.P.* '14), contains Volatile oil. Congealing point ot below +3° C.—U.S. *Dose.*—5 to 15 minims. Sp. Gr. 0·960 to 0·990. oluble in an equal vol. of 90% alcohol. Constituent anethol, aromatic.

Given to infants in form of **Aqua Fœniculi.**

Fœnugreek. *Trigonellæ Fœnu-græci Semina* (*Leguminosæ*). The herb is rgely grown in India and Egypt. Contains large proportion of mucilage and bout 5% oil. Chief use, veterinary. An Egyptian preparation, *Helba,* is nade from Fœnugreek Seeds—when soaked they swell into a pasty condition ke a pudding—in Cairo this is hawked in the streets, and the cry of 'Helba' a familiar one. A medical man goes so far as to call it the Quinine of Egypt -it prevents fever, and is valuable in many ways. It is stated to be comfort-g to the stomach. Stomach complaints in the Cairo district are common -supposed to be due to the water, but more likely from colds and chills. he seeds may be ground to powder and swallowed in about 1 or 2 teaspoonful oses. Or the seeds infused in water for a few hours and the supernatant quor employed. Or a handful of the seeds is soaked in a basin of water for om 12 to 24 hours, then removed and placed in an unglazed flower-pot (which as been previously kept under water ½ hour) and allowed to sprout during 3 4 days. When the plant has grown to about 2 inches it is ready for use.

It is eaten raw along with the seeds. This sprouted remedy is best and most employed. It has been tried in diabetes.—Geo. H. Stephenson, Cairo.

Fragaria Vesca. STRAWBERRY. Sprue treated with Ethereal Strawberry Extract. The use of strawberries for sprue is well known. Zilva showed that it was possible to extract by alcohol the fat-soluble factor from vegetables and that this extract also contained the antineurotic and to small extent the antiscorbutic factor. An Ether extract of the Alcohol extract contained a substance which promoted the recovery and renewed growth in rats declining on account of fat-soluble factor. Clinically, in typical sprue cases, with usual diet, has been found beneficial.—A. Castellani and K. C. Browning, B.M.J. i./22,718.

Frangula. *Rhamnus Frangula* Bark (*Rhamnaceæ*), Buckthorn Black Elder or Alder Buckthorn. It grows all over Europe and in America. Should be 1 year old. Contains Emodin, etc.—Y.B.P. '23,223. Cathartic especially for hæmorrhoids and chronic constipation. Liquid Extract B.P. '85 1=1. *Dose.*—1 to 4 drachms. Common Buckthorn in this country is *R. catharticus*.

Syrupus Rhamni, B.P.C. *Dose*, ½ to 1 drachm. Is prepared from Common Buckthorn Berries. Evaporate fresh buckthorn berry juice 50 to 30 and set aside 12 hours, filter and dissolve sugar 65 in the filtrate with heat, strain and cool. Mix Strong Tincture of Ginger 0·52 with Alcohol 3·12, add to the Syrup and finally water to 100 by weight.

Laxative action of *Alder Buckthorn Bark* due to a stable amorphous glucoside, Glucofrangulin, a new kind of anthraglucoside.—P.J. ii./25,37; ii./26,738.

Fucus Vesiculosus (*Fucaceæ*). **Bladder** or **Sea Wrack.** Preparations of this, being rich in iodine, bromide, and chlorine salts, have had reputation for reducing corpulence. It is stated to contain a considerable amount of Mannite. **Extract, B.P.C.** Exhaust the drug in No. 20 powder with alcohol 45% and evaporate. This contains about 3% of Iodine. (Fucus vesiculosus may contain as much as 0·21% of Iodine. The yield of extract is about 1 from 15.) *Dose.*—3 to 10 grains before meals, in pills with althæa. **Liquid Extract**, B.P.C. 1=1 of Bladder Wrack in 45% Alcohol. *Dose.*—1 or 2 drachms before meals. It is recorded a lady lost 20 lb. in 9 weeks when taking the liquid extract; and a gentleman 8 lb. in 6 weeks; another 8 lb. in 3 weeks, without bad results.

In thyroid gland disease. In some experiments to determine the smallest quantities of various Iodine Compounds which when given to animals caused distinct changes in their resistance to Acetonitrile and at the same time to find out the maximum effect which could be obtained—bladder-wrack was found to rank first—it increases the thyroid secretion markedly. Iodine compounds affect the resistance of animals to Acetonitrile only through the thyroid gland. The Iodine of Fucus is 80 to 100 times as active as that of any other Compound studied in the investigation.—L. ii./10,842.

A sugar isolated from.—J.C.S.A. i./1909, p. 387.

Chronic subcutaneous fibrosis treated by Fucus combined with a more or less strict diabetic diet, exercise and massage.—B.M.J i./11,354

✱ Integar Capsules (T.M. 421774). *Dose.*—One or two at bedtime. A preparation of Fucus Vesiculosus, Ox Bile and Pancreatin. Laxative, cholagogue and intestinal antiseptic useful in intestinal catarrh and colitis.

Galangal (*Zingiberaceæ*). Indian Root, China Root in 2 varieties: 'large' from *Alpinia galanga*, Willd., and 'small' *A. officinarum*. *Dose.*—15 to 30 grains Aromatic tonic, **Contained in 'Hippocras,' *q.v.***

Galbanum (B.P., 1898). *Dose.*—5 to 15 grains. Gum resin from *Ferula Galbaniflua* (*Umbelliferæ*) and other species Expectorant and stimulant.

Persian Galbanum. The exact botanical source of varieties is uncertain. —P. H. Marsden, P.J. ii. /15,356.

Galega officinalis, or goat's rue, has a reputation as a galactagogue when given to nursing women. An extract is prepared. *Dose.*—5 to 10 grains.

A most effectual galactagogue.—R. Eyzaguirre, per Jl. Trop. Med. Nov. i./22,348. Tephrosia virginiana is also known as goat's rue, but is not the drug intended for use.

Galium Aparine.—The plant Cleavers or Goose Grass. Is acid, astringent, and diuretic. Has been used in dropsy, jaundice, scrofulous scaly eruptions, epilepsy, and obesity. **Succus Galii**. *Dose.*—1 to 2 drachms; and **Extractum Galii**, 5 to 20 grains. For psoriasis.

Galla. *Dose.*—7½ grains. Excrescences on *Quercus infectoria* (*Cupuliferæ*), caused by deposition of eggs of *Cynips Gallæ Tinctoriæ* (*Hymenoptera*), stringent. Contain Tannic and Gallic Acids. **Unguentum Gallæ** (*B.P.* '14), to 4 of Benzoated Lard.

Gentianæ Radix.—Dried rhizome and roots of *Gentiana Lutea* (*Genti-aceæ*). A bitter tonic. Yields 30 to 40% of Aqueous Extractive. his is largely used as a pill excipient. Gentian (P. Jap.) is 'Ryutan.' rof. Greenish on Powdered Gentian.—P.J. i./12,201. Gentiopicrin $C_{16}H_{20}O_6$ -an 'anthermic' glucoside is contained to extent of 1·5%. Has properties llied to quinine. *Dose.*—20 to 30 grains in malaria.—Y.B.P., 1913,127.

Pastilli Stomachici, P. Jap. IV., Sodium Bicarbonate 0'25 Gm., Ryutan '1 Gm.

Infusum Gentianæ Compositum (*B.P.* 14). *Dose.*—½ to 1 ounce. An ıfusion of Gentian Root, Orange Peel and Fresh Lemon Peel. (Dry may be sed in the Tropics.) For dispensing, fill strong half-pint bottles, plug the ecks well with cotton wool, stand in suitable pan and heat to boiling point) minutes and allow to cool. Will keep a week, and the flavour is good. **ıfusum Gentianæ Aromaticum** (was Brompton H.), Gentian Root 2 ounces, emon Peel 6 drachms, Orange Peel 3 drachms, Boiling Water 1 gallon. inctura Amara. P.G. VI. Gentian Root 3, Centaury Root 3, Orange Peel Orange Berries 1, Zedoary Root 1, Diluted Alcohol (67 to 69% volume) 50. **Mistura Gentianæ Alkalina.** Brompton H. Sodium Bicarbonate 5 grains, Gentian Infusion to 1 ounce. (Ⓟ Previously contained Hydro-yanic Acid, 3 minims). **Elixir Gentianæ Acidum.** *Martindale. Dose.*— to 2 drachms in a little water. Concentrated Compound Infusion of Gentian) minims, Taraxacum Juice 10 minims, Dilute Phosphoric Acid 2½ minims, herry 20 minims, Glycerin 7½ minims. **Infusum Gentianæ Compositum oncentratum.** *Dose.*—30 to 60 minims. Gentian and Orange Peel in No.) pdr. each 2, Lemon Tincture 2, Orange Tincture 1, Alcohol 90% 3·5, Diluted hloroform Water to 20 by process (a) for infusions (*q.v.*) 1 part diluted to 8, esembles *B.P.* '14 Infusion.

Preparation of Gentian Extract rich in Gentiopicrin.—P.J. i./12,125.

Gencydo. (T.M. 424634). A preparation for hay fever made from plants ontaining lime salts and vegetable acids. (The lime treatment of hay fever thought by some to be important.) *Ampoules* stated to contain Gentiopicrin 01 Gm., and Extractum Cydoniæ Seminum 0'01 Gm. for injection. A quid containing the same ingredients is used as a paint for the nose, as so an ointment.

Geranium Maculatum (*Geraniaceæ*).—Cranesbill root. *Dose.*—15 grains 1 drachm is a powerful astringent; contains about 16% of tannin; used diarrhœa, and locally in relaxed conditions of the mucous membranes. eranin, a dried extract, is given in dose of 1 to 5 grains. Liquid extract, =1. *Average dose.*—15 minims.

Germanium Dioxide. An American method of treatment of pernicious næmia, less toxic than arsenic. Causes in animals a distinct rise in the umber of blood cells, but in practice the results were negative.—M. G. Alex-nder, B.M.J. ii./22,979.

It is stated to have *no* haematopoietic effect and is toxic—per Pres., Jan. 6,2.

Ginseng. *Dose,* 15 grains to 1 drachm. The name applied in China to oots of probably several plants to which are attributed miraculous properties.

The active principle of Ginseng is a glucoside—extracted by pure Alcohol. -I. Saito and K. Abe, per Jl. Trop. Med., Mar. 1/23,85.

The Chinese actually count five kinds of Ginseng. According to them ıe true Ginseng, 'Panax' Ginseng, acts on the spleen, which is to them the entre of life: Adenophora acting on the lungs; Scrophularia on the kidneys: olygonum Bistorta on the liver: Salvia Multiorrhiza on the heart. The true ild-growing root from Manchuria is most prized.—From Stuart's Chinese ateria Medica. As much as would lie on a penny was taken thrice daily ithout any noticeable effect.—H. Gilbert Carter, Sept., 1926.

Glaucium Luteum.—Yellow-horned or Sea Poppy. 1 drachm doses of iquid Extract have been given in glycosuria. The alkaloids Glaucine, rotopine and Chelerythrine are present.

Gloriosa Superba, *N.O. Liliaceæ.* A poisonous plant common in Upper urmah. Contains Colchicine.—Clewer, Green and Tutin, J. C. S., 1915,)7,835; F. L. Pyman, C.D., July 31, 15,164.

Glucosides. Principles found mainly in plants, possessing the property being converted into glucose or an allied sugar and one or more simpler or more complex products by the action of dilute acids, alkalis, enzymes or simply by heating with water and taking up the elements of water in the reaction,—*i.e.*, hydrolysis. Examples are Amygdalin, the Digitalis Glucosides, Phloridzin, Salicin; Bourquelot on.—B.M.J. i./21,59.

A review of Glucosides.—J. E. Driver and G. E. Trease, P.J. i./27,622.

Glycogen $[C_6H_{10}O_5]n$—A body allied to starch. *Dose.*—1½ to 2 grains. It occurs in the liver, blood, horseflesh, &c. It is said to be changed at death into glucose, maltose, and isomaltose; given medicinally said to improve nutrition.

Glycyrrhiza. *Dose.*—5 to 20 grains or more. The peeled root and subterranean stem of *G. glabra (Leguminosae)—B.P.*'14. Aqueous extraction usually yields 24 to 38% **Solid Extract.** *Dose.*—5 to 60 grains. **Extract Liquid** (*B.P.* '14). By cold exhaustion with Chloroform Water 1=1, contains ⅕ of its volume of 90% alcohol. *Dose.*—½ to 1 drachm. Incompatible with acids.

Elixir Pectorale.—*Syn.* **Liquor Pectoralis. P. Dan.** King of Denmark's Chest Mixture. *Dose.*—1 drachm. Extract of Liquorice 1, Fennel Water 3, Anisated Liquid Ammonia 1. *Note a further form below.*

(**Liquor Ammonii Anisatus.**—*Syn.* **Esprit Ammoniacale Anisé** consists of Oil of Anise 1, Alcohol 25, Solution of Ammonia 5. Several of the Foreign Pharmacopœias gave similar formulæ, *e.g.*, that of P. Dan. 1908 and P.G. VI.)

Liquor Pectoralis, P. Svec. X. Licorice Extract 200, Fennel Water 600, Ammonia Solution 9% 35, Anise Oil 2, Alcohol 90% 163. *Note a further form above.* Ⓟ **Liquor Pectoralis Benzoicus, P. Svec. X.** Tinctura Opii Benzoica 1, Liquor Pectoralis 3.

Glycyrrhizinum Ammoniatum. *Dose.*—½ to 5 grains. Glycyrrhizin is contained in the root as the Ammonium Salt—*further details Vol. II.* Readily soluble garnet coloured, shining scales. It possesses a persistent sweet taste. The acid precipitated from it is bitter-sweet. A grain will flavour 6 ounces of water. It may, perhaps, be considered as the Ammonium Salt of Glycyrrhizinic Acid which, according to Tschirch, has the formula $C_{41}H_{61}O_3(COOH)_3$. *For further details on this and the Assay of Liquorice vide Vol. II.*

Liquorice preparations cover the taste of ammonium chloride, alkaline iodides, cascara, magnesium sulphate, quinine sulphate, ipecacuanha, and aloes, hence is in Mistura Sennæ Composita, Decoctum Aloes Compositum and Confectio Sennæ.

In addition to the extracts, dried 'Liquorice Juice,' or 'Spanish Liquorice,' is sold, that bearing the stamp of Solazzi being most prized. Pontefract Cakes of Liquorice and 'Pipe Liquorice,' are useful in allaying tickling coughs.

Trochisci Glycyrrhizæ, Brompton H., commonly known as 'Brompton' Cough Lozenges, or 'Brompton Blacks,' contain Liquorice Extract 3 grains, Anise Oil ½ minim in each (Acacia basis). **Pastilles de Réglisse.**—Liquorice pastils, much used in France.

Pulvis Glycyrrhizæ Compositus. (B.P. '14). *Syn.* PULVIS PECTORALIS (*Kurellæ*). Senna and Liquorice of each 2, Fennel 1, Sublimed Sulphur 1, White Sugar 6½. Mix.

Dose.—1 to 2 drachms, mixed with water or milk, taken early in the morning, is a mild and agreeable laxative. For constipation and hepatic disease, it is pleasant to take, and effectual without catharsis. U.S. uses oil of fennel, which makes it less granular. It is also prepared *sine Saccharo* (Hewlett)—with *half* above dose, more palatable, and more suited for use where sugar is barred.

Poudre de Réglisse Composée. *Syn.* PULVIS LIQUIRITIÆ COMPOSITUS FR. CX. contains Liquorice 1½, Senna (washed with alcohol and powdered) 1½, Fennel 1, Sublimed Sulphur 1, White Sugar 5.

Species Pectorales, P.G. VI. Coarsely cut Marshmallow Root 8, Liquorice Root 3, Orris Root 1, Tussilago Farfara (Coltsfoot) Leaves 4, Verbascum Flowers 2, Anise 2.

Manchurian Liquorice Root, *G. uralensis Fisch* or *G. pallidiflora Maxim*: contains an average percentage of Glycyrrhizic Acid, and though giving an aqueous extract in accordance with B.P. requirements, is excluded in that it is unpeeled.—I. R. Fahmy, B.P. Conf. 1923. P.J. ii./23,113.

Gokhru.—The prickly fruit of *Pedalium Murex.* A remedy for nocturnal seminal emissions, incontinence of urine and impotence. Is rich in mucilage. **Of an** infusion 1 in 10 of boiling water (stand 2 hours) half a pint is a daily dose. Should be freshly made. **Liquid Extract** 1=1, made with Alcohol

90%. *Dose* —20 to 60 minims. Burra Gookeroo is believed to be identical with *Pedalium Murex fruit.* It is used similarly in India, though by some it is identified as *Tribulus lanuginosus* (*Zygophyllaceæ*). **Guaycuru** (*Statice braziliensis*). Emmenagogue (?) Infusion, taken freely Astringent. For dysentery.—Ph. Notes. River Plate.

Guarana. P. HUNG. *Dose.*—10 to 60 grains in powder, or infused in a cup of boiling water. The seeds of *Paullinia Cupana, P. sorbilis* (*Sapindaceæ*), roasted and moistened with water, made into a hard paste, rolled into cylinders, and dried. Imported from Brazil. The drug contains 2·5 to 5% **Guaranine,** which is identical with caffeine, *q.v.*, together with tannin gum, &c. Is recommended for sick-headache. A nervine tonic. *Dose.*—⅓ to 5 grains or more U.S. IX· had standard 4% alkaloids. *Assay.*—By shaking with chloroform and ammonia. Methods of preparation of Guarana by the Guarani Indians.—P.J. ii./10,577. **Liquid Extract.** *Dose.*—½ drachm. Standardised to 4 Gm. (average) Alkaloids in 100 Cc. Prepared by percolation with Diluted Alcohol. **Tincture.** *Dose.*—½ to 1 drachm. Macerate Guarana 1, in Alcohol 60% *q.s.* to produce 4.

Gymnema Sylvestre (N.O. *Asclepiadaceæ*). An Indian creeper whose leaves when chewed relieve sweet taste of sugar. Decoction of powdered leaves reduced or eliminated sugar in urine of diabetics.—K. G. Gharpurey, I.M.G., Mar. '26,155.

Hæmatoxyli Lignum, Logwood. (*B.P.* '14.) The unfermented heart-wood of *Hæmatoxylon Campechianum* (*Leguminosæ*). Of sweetish astringent taste. The fermented chips used by dyers are deep red in colour, have lost the sweet taste and the hæmatoxylin is oxidised to *Hæmatein*, $C_{16}H_{12}O_6$.

Preparations of logwood, colour the fæces and urine red, and stain linen. *Incompatible* with acids and lime water. Certain metallic salts (notably iron) produce blue colour; mercuric salts brown. The decoction is a remedy for diarrhœa and some forms of urinary hæmorrhage. **Liquid Extract, B.P.C.** 1 = 1. *Dose.*—½ to 2 drachms (2 to 8 Cc.). **Extract,** An aqueous extractive completely soluble in water *Average dose.*—15 grains.

Decoctum Sappan 1 in 20 of **Sappan** Wood (*Cæsalpinia Sappan, Leguminosæ*) is *B.P.* '14 and is similar to Logwood.

Hæmatoxylin. $C_{16}H_{14}O_6 + 3H_2O = 356{\cdot}16$. Usually in yellowish granular crystals, slowly soluble in water, easily in alcohol. Alcoholic Solution 0·2% is used as indicator—yellow in acid and purple in alkaline solution. Also for staining in microscopy. *vide Vol. II.*

Logwood cultivation in Jamaica.—P.J. i./26,328.

Harmine and **Harmaline.** Alkaloids contained in the seeds of *Peganum Harmala.* A strong smelling herbaceous plant *N. O. Rutaceae.* It is the wild Rue of Dioscorides. Further details 17th Edn. p. 799.

Harmaline has a toxic action on trypanosomes *in vitro* but no curative effect on the disease in rats. In 50% only of the cases treated it caused disappearance of the parasites from the peripheral blood in acute malaria and fall of temperature. It is thought inferior to quinine for acute malaria. Harmine failed to cut short acute attacks. In three cases of relapsing malaria it proved remarkably successful. Both alkaloids could with safety be given in larger doses than those employed with possibly better results.—Prof. J. A. Gunn and Lt.-Col. D. G. Marshall, Proc. Roy. Soc. of Edinburgh, Vol. xl, Part ii (No. 15), 1920.

Trypanosomiasis treated by Harmala Alkaloids (Gunn)—not found curative. Review of tropical diseases.—R. T. Hewlett, Pr., April, 1921.

Hedera Helix (*Araliaceæ*), **Ivy**—juice of leaves has been used to ulcers The berries are said to be purgative.

Leaves of ordinary common Ivy, taken by a child, caused poisoning. Intense scarlatiniform rash produced (as in the case of Rhus toxicodendron). Emetics failed to act. The stomach was washed out and a stiff dose of Castor Oil was given.—P. H. J. Turton, B.M.J. ii./25,294.

Hederin—a glucoside with Digitalis-like action, but is injurious to the heart and blood corpuscles.—B.M.J. i./12,61.

Heliotropin, $C_6H_3O_2CH_2COH = 150{\cdot}048$. *Syn.* Piperonal, a Methylene derivative of Protocatechuic Aldehyde, when pure is in shining white flaky crystals with Coumarin odour, slightly soluble in water, freely in alcohol, much used in perfumery. Usually manufactured by oxidation of safrol with chromic acid.

Helonias dioica.—False Unicorn Root. Is used in colic and in atony of the generative organs; also employed as an abortifacient.

'Helonias Compound.' Aloes 9 oz., Helonias 14 oz., Tansy 14 oz., Oil of Pennyroyal 1½ oz., Oil of Cassia 1 drachm, Cayenne ¾ oz., Myrrh 8½ oz., in 1 gallon of 17% Alcohol. *Dose,* 1 drachm in a cup of hot water, sweetened, twice daily. For promoting menstruation. A case in which a man was proved guilty of supplying a noxious drug to procure miscarriage.—P.J. ii./24,342.

Sometimes known as Egyptian Privet—it resembles common privet.

Henna, *Lawsonia inermis* (*Lythraceæ*). The powdered leaf is employed as a hair dye, usually in conjunction with indigo, *e.g.*, the following:—Apply a paste of Henna 1, Indigo 2, for varying periods according to the shade required—one hour for light brown. 1½ hours for darker—should be tried experimentally before use. Henna stains the skin as well as the hair. In some cases Cupric Chloride and Pyrogallol are used in conjunction with Henna, and again Borax is occasionally an adjuvant, the idea being no doubt that the pyrogallol oxidises more readily in alkaline solution. The quantities relative to the Henna in such cases are exceedingly small. It is employed internally and locally in jaundice, leprosy, and skin affections.

For an account of History, Botany, Cultivation and Chemistry of Henna and Shampoo formula see E. M. Holmes, P.J. i../24,437.

The constitution of Lawsone.—J.C.S.A. i./20,626.

Holarrhena Antidysenterica (*Apocyanaceæ*). *Syn.* according to some, Wrightia Antidysenterica, Bengali *Kurchi* or *Coorchi*, a small deciduous tree found throughout India. An infusion of the bark (and seeds) has remarkable effect in dysentery. The plant, as also *H. Congolensis* from the Congo contains **Conessine** $C_{12}H_{20}N$. This alkaloid has strong inhibitory action on amœbæ—equal to that of Emetine. It is 50% less toxic than the latter. Conessine salts can be given *per os.* and intravenously but subcutaneously it produces necrosis at site of injection. Suggested dose of Powdered Bark 2 to 5 grains. A **liquid extract** 1=1 was tried with good result.—I.D.C. 1916; H. C. Brown, B.M.J. i./22,963; F. L. Pyman, J.C.S.T., Feb. 1919, p. 163. **Kurchi Tablets** are made 5 grains.

Antidysenteric value compares favourably with any other remedy in vogue and depends on use of entire seed or bark. Recommended daily dose of 60-120 grains of powdered bark in 3 or 4 portions.—L. i./28,39: see also T. A. Henry and H. C. Brown, *ibid.* 108.

Holarrhena var. also contain the alkaloid **Holarrhenine.**

See also our page 536.

Hordenine. *p.*Oxy-phenyl-dimethyl-ethylamine $C_6H_4OHC_2H_4N(CH_3)_2$. Alkaloid obtained from barley in the process of malting. Leger, *Comptes Rend.* 142 (1906) 108; 143, 234, 916. The compound has been synthesised. Refs. 18th Edn., p. 834. It will be seen the substance bears constitutional resemblance to Tyramine *q.v.* *Dose* uncertain, but 1 Gm. doses have been given to a suckling child. Suggested in hyperchlorhydrosis, enteritis and diarrhœa.

Hydrangea (*Saxifragaceæ*). A decoction of the plant (*H. Arborescens*) is stated to have been used with advantage by the Cherokee Indians in calculus diseases.—U.S.D. **Elixir of Lithia** and **Hydrangea.** *Dose.*—1 to 2 drachms. A proprietary preparation stated to contain in an ounce Lithium Salicylate 12 grains, Lithium Benzoate 12 grains, Hydrangea root 240 grains. A diuretic and diaphoretic preparation for use in gout and rheumatism.

The Canadian Formulary 1910, had an **Elixir** (of different strength to this). Dissolve Lithium Salicylate 600 grains and Lithium Benzoate 300 grains in Aromatic Elixir 25 ounces,—add Alcohol 95% 7½ ounces to Fluid Extract of Hydrangea 7½ ounces and mix all together. *Dose.*—1 to 2 drachms well diluted with water between meals and at bedtime. (Liquid Extract of Hydrangea may be prepared 1 = 1 with 45% Alcohol.)

Hydrocotyle asiatica, Ph. Ned. V. Water Pennywort Leaves. The umbelliferous herb is used in India for skin diseases and ozæna in 4 to 10 grain doses internally; it is added to lard as an ointment, also to poultices, and used as snuff in ozæna. Contains 15% of a volatile oil.

Hydroxylamine, NH_2OH=33·032, is formed by the action of nascent hydrogen on nitric acid. Its strong reducing properties suggested its use in tinea and psoriasis. It is a strong antiseptic. Does not stain the skin. The HYDROCHLORIDE, $NH_2OH.HCl$=69·497, is in hygroscopic crystals, with an acid taste and reaction, freely soluble in water. Solution 1 in 1,000 of equal parts of glycerin and alcohol or ointment with adeps lanæ, successful in lupus, ringworm, and parasitic sycosis. May produce smarting.

Manufacture.—Hydroxylamine is prepared by passing Sulphur Dioxide (4 molecules) into a concentrated solution of Sodium Nitrite (2 molecules and Sodium Carbonate (1 molecule) at −2° to −3° with constant stirring until just acid. The solution is warmed with a few drops of Sulphuric Acid and then kept at 90—95° for two days. Neutralise with Sodium Carbonate and evaporate until the solution weighs about 10½ to 11 times as much as the Sodium Nitrite originally taken. The Hydroxylamine Sulphate is obtained from the motherliquors and recrystallised.—Thorpe, Vol. III./1912.

Our experience with the method was that after passing in Sulphur Dioxide for 4 or 5 hours the liquid tended to turn brown—then decolorised and crystallised out. More water was added at this stage. The process gives satis factory result but Hydroxylamine Hydrochloride is difficult to obtain crystalline.

It may also be made by electrolysis of Nitric Acid. The process is conducted in a cathode cell using mercury or amalgamated copper electrodes. The electrolyte is sulphuric acid of over 40% strength and the nitric acid is slowly dropped in, the whole being kept cool. The Hydroxylamine is recovered as sulphate.—P.J. i./16,3.

Hydroquinone. *Syns.* QUINOL, HYDROCHINON (German). *Dose.*—½ to 5 grains $C_6H_4(OH)_2$ 1 : 4 = 110·048. An isomeride of Resorcin $C_6H_4(OH)_2$ 1 : 3, and Pyrocatechin 1 : 2.

For a note on Chemical Method of Manufacture, see Edn. XVIII., p. 835.

Electrolytical deposition is more economical than the chemical method. Theory of the reaction.—P.J. i./16,3.

Poisoning by Hydroquinone—20 grains recovered from dejecta.—A. Mitchell, & J. Webster, B.M.J. ii./19,465.

It is *Soluble* 1 in 20 of water, also in alcohol about 1 in 4. It possesses stronger antiseptic and antipyretic properties than Resorcin, also resembles carbolic acid. Is used as a photographic developer, *q.v.* Qualitative reactions of Pyrocatechin.—P.J. i./07,208,430.

Hysterionica. *Syn. Aplopappus Baylahuen* (*Compositæ*) *Remy.* From Chili. Recommended in malarial and chronic dysentery, flatulent dyspepsia and diarrhœa. **Liquid Extract.** *Dose.*—5 to 15 minims.—N.S.D. p 1394.

$\boxed{\text{P1}}$ **Ibogaine.** $C_{52}H_{66}N_6O_2 = 806{\cdot}576$. An alkaloid obtained from the Iboga (*syn.* aboua, or obouete or liboka) (N.O. *Acanthaceæ*), *Tabernanthe Iboga*, Baill., a plant growing in West Africa, particularly the Congo. Said to have aphrodisiac and sustaining powers. Too large a dose may produce tetanus and convulsions. The plant has been tried in sleeping-sickness. The base is soluble 1 in 28 alcohol 95 per cent. at 15° C. Insoluble in water. M.pt. 151° C. Its solutions are lævorotatory. In solution the substance oxidises, but keeps well in crystalline form. **Nyrdahl's Dragees** contain 0·005 Gm. ($\frac{1}{12}$ grain), with dose 2 to 6 *pro die.* $\boxed{\text{P1}}$ **Ibogaine Hydrochloride** given in influenza, angina pectoris and other heart affections.

Ichthyocolla (P. Belg.) Isinglass. The swimming bladder of certain species of the sturgeon and hake; dried and sliced into thin pieces. About 3 drachms to the pint of warm water forms a jelly. Is used for refining wine. Added to milk to prevent formation of tough curds difficult of digestion. Isinglass Plasters on Muslin, 8 inches wide, yard rolls (also 11 inches by 5 yards). Also Tapes, ¼, ½ and 1 inch, 10 yard lengths. Also Isinglass on Silk, 7 inches wide, flesh-colored, black and white, are made. P. Jap. gives method of making Court Plaster.—"Emplastrum Adhæsivum Anglicum."

Sinclair's Glue.—Glue 50, water 50, glycerin 2, calcium chloride 2, thymol 1. For applying extension in fractures instead of plaster. Melt on water bath when required and apply with the hand using a bandage if necessary.

The following is more elastic:—Isinglass 50, glue 50, water 50, calcium chloride 2, tannin 12, glycerin 2, thymol 1.—B.M.J. ii./17,60.

The Thymol content is excessive. One-tenth of the amount in either of the above is ample. 'Blistering' of the skin has occurred in its use which we attribute to the amount of Thymol.—W.H.M.

Inula Helenium (*Compositæ*).—Elecampane. Root contains Inulin allied to Starch, and Helenin. *Dose.*—¼ to 2 grains a stearoptene, in white crystals, insoluble in water, but freely in alcohol. Is antiseptic, used in ozœna, keeps off insects, and internally for phthisis, malarial fevers, infantile and catarrhal diarrhœa; checks bronchial secretion. **Inulin** from this and from Dahlias and Helianthus is the same. It is present in Burdock root to the extent of 45%, Dahlias 20%.—Holmes. **Extractum Inulæ Liquidum.** 1=1. *Dose.*—10 to 60 minims. **Extractum Helenii** (solid) is also made.

Ipomœa batatus is the **Sweet Potato** which is used as a vegetable in many parts of the world—Persia, India, Japan, China, etc. A perennial plant, the tubers being dug and removed from the plant, which is left to grow until replanting is deemed necessary.—P.J. ii./11,417

Ipomœa. *B.P.* '14. *Syn.* Orizaba Jalap Root. Mexican Scammony Root. Dried root of *I. orizabensis* Ledenois (*Convolvulaceæ*). To yield not less than 15% total resins.—U.S. X. **Resina Ipomœæ** U.S. X. is prepared by adding water to the Alcoholic Extract. *Dose.*—3 grains. *See Jalap.*

Iridin.—*Syn.* **Extractum Iridis.** *Dose.*—1 to 3 grains in a pill alone or with extract of henbane, or with one grain of Euonymin.

The dark brown powdered extract made with Alcohol 60% from the root of the blue flag, *Iris versicolor* (North America). Has a bitter, acrid taste, possesses cathartic, alterative, and diuretic properties, given in hepatic and intestinal disorders.

Iris Florentina, I. Germanica, &c. (Italy), yield **Orris Root** of perfumery, containing '**Butter of Orris**' about 0·15%, a sweet-scented fatty substance. *Tinctura Iridis* is prepared from the root in 8 Alcohol 90%.

Sneezing treatment for prevention of adenoids satisfactory. Powdered Orris Root and soap used to lightly touch the nasal septum. It is not sniffed up the nose.—L. ii./18,240.

Ispaghula, *B.P.* '14. *Dose.*—45 to 150 grains. Pinkish brown boat-shaped seeds of *Plantago ovata* (*Plantaginaceæ*). Much valued as demulcent = Linseed or Barley.—Decoctum. *Dose.*—½ to 2 ounces. 1·5% in water.

Ixora Coccinea. *Syn.* FLAME TREE. *Dose* of the powdered drug.—30 to 45 grains with aromatics. In dysentery. **Tincture.** *Dose.*—1 to 1½ drachms in water twice or thrice daily as tolerated, increased if necessary. 1 in 5 alcohol 60%. **Mistura.** *Dose.*—One ounce thrice daily as tolerated, increased if necessary. Tincture of Ixora 1 ounce, Peppermint Water to 8 ounces.

Jalapa. *Syn.* BRYONE OR MECHOACAN NOIR. *Dose.*—5 to 20 grains. The dried tubercles of *Ipomœa Purga* (*B.P.* '14), *U.S. Exogonium Jalapa* (*Convolvulaceæ*). A powerful purgative producing watery stools, is apt to gripe; must be avoided if the bowels are inflamed. Used to reduce dropsy of Bright's disease, and to relieve uræmia. The **Extract** (*Dose.*—2 to 8 grains), **Resin** and **Tincture** are mostly used. **Tinctura Jalapæ Composita.** *Dose.*—½ to 1 drachm. Contains 8% Jalap with Scammony Resin and Turpeth.

Jalapæ Resin, P.G. VI. and **U.S.** *Dose.*—2 to 5 grains. Contains two glucosidal resins, about 90% Convolvulin (*Syn.* JALAPURGIN), soluble in alcohol but insoluble in ether [this should be termed JALAPIN, as understood in England (*dose* 1 to 5 grains)], together with about 10% Jalapin (Mayer), (*Syn.* ORIZABIN), soluble in ether and in alcohol. The latter, the principal constituent of spurious Jalap (*Ipomœa simulans* and *I. orizabensis*), is identical with **Scammonin** (*dose,* 1 to 5 grains) from scammony root, *Convolvulus Scammonia* (*Convolvulaceæ*). It is cheaper and less active. The average yield of resin from Jalap is about 10%. FR. CX. requires 7%. *B.P.* '14 requires to contain not more than 15% ether-soluble. *For further data on Jalap and Scammony Resin, see Vol. II.*

Pulvis Jalapæ Compositus (*B.P.* '14). *Dose.*—10 to 60 grains. Contains 30% Jalap with Ginger and Acid Potassium Tartrate.

A new Jalap resin, known as '*Regina de Batata de Purga,*' and extracted from the tubercle of *Convolvulus Operculatus*, is extensively used in Brazil. It possesses the same properties as the official Jalap, but is practically devoid of any subsequent constipating action. *Dose.*—0·25 to 2 Gm.—C. & D. i./25,854.

Juglandin.—An extractive prepared from the inner bark of the root of *Juglans cinerea*, the North American butter-nut; is an hepatic stimulant and cathartic. *Dose.*—2 to 5 grains in pill. **Spiritus Nucis Juglandis,** distilled from *Juglans regia*, the common European walnut, is an antispasmodic and for checking sickness of pregnancy. *Dose.*—1 to 4 drachms. **Folia Juglandis** are in P. Austr.: also in P. Belg. (and Fluid Extract) and P. Helv. **Walnut hair dye.** A formula for this was given in Edn. XVIII, but it is not satisfactory. Certain hair dyes of the kind owe their efficacy to aniline dyes.

Juniperi Oleum. Oil distilled from fruit of *Juniperus Communis* (*Coniferæ*) and 'rectified.'—*B.P.* '14. Sp. Gr. 0·862 to 0.890, increasing with age. Soluble (when freshly distilled) 1 in 4 of 95% alcohol, becoming less soluble with age. We found a sample 4 years old was not clearly soluble in any reasonable proportion. The following test would condemn the majority of samples adulterated with Turpentine. "If 50 c.c. be distilled from a three-bulb Wurtz flask, the lowest of which holds 100 c.c., not more than 75% should distil below 180° C.; the residue in the flask should have a specific gravity not below 0·892 and a refractive index not below 1·4950"—Parry. **Spiritus** 1 in 10. *Dose.*—5 to 20 minims. **Spiritus Juniperi Compositus.** *Dose.*—2½ drachms. Oil of Juniper 8, Oil of Caraway 1, Oil of Fennel 1, Alcohol (99%) 1,400, Water to 2,000. Terpeneless and Sesquiterpeneless Juniper Oil is stable and soluble in comparatively weak alcohol. **Vinum Diureticum,** P. Helv. *Dose.*—½ to 1 ounce. Juniper 15, Squill 10, Orange Peel 10, Absinthe 5, Angelica 5, Sweet Flag 5, Dry Southern Wine 1,000.

Oleum Juniperi Ligni. A trade name for Fictitious Juniper Oil supposed to be made from the wood but is generally a mixture of Juniper Berry Oil and Turpentine; *cf.* also Juniper Tar Oil.

Kaladana (*B.P.* '14). *Syn.* PHARBITIS SEEDS. *Dose.*—30 to 45 grains. Dried seeds of *Ipomœa hederacea* (*Convolvulaceæ*). Purgative and Anthelmintic—equivalent Jalap.—Give dose 60 to 120 grains.—I.D.C.

Pulvis Kaladanæ Compositus, *B.P.* '14. *Dose.*–10 to 60 grains. Kaladana 30%. Equivalent to Pulvis Jalapæ Compositus. **Tinctura,** *Dose.*—½ to 1 drachm. 1 in 5 of Alcohol 70%. **Kaladanæ Resina.** *Dose.*—2 to 8 grains. Useful hydrogogue.—I.D.C.

Kala signifies *black* and *dana* means seed. Other seeds are collected and shipped in place of genuine. Chemical and Histological Research on the seeds and resin.—H. C. Kassner, P.J. i./24,155, 182, 207, 231, 261, 306, 328, 357.

Kauri Gum. A resin obtained from *Dammara Australis* in Australia and New Zealand. **Dental Compo.** Contains Kauri Gum. This is used for taking impressions of the mouth and teeth for plate preparation. *Directions.*—Place the cake of Compo in moderately warm water for about two minutes or so to soften—do not employ boiling water. The Compo should be kneaded with the wet fingers until it has hardened somewhat; by this proceeding it becomes almost cool. The Tray should be warmed for a short time before placing the Compo into it. The surface of the Compo is then smoothened with the hand, a little vaseline is rubbed on the surface, and the tray is held for a second or two over a Bunsen flame. It is very important that the surface of the Compo should be heated in this way before inserting into the mouth. After inserting wait for 2 or 3 minutes. On removal, place the tray bearing the impression in cold water.

Kauri 'Gum.' Its collection and commerce.—Jas. B. Aitken, P.J. i./15,550.

Kava-Kava. *Syn.* **Awa Root,** *B.P.* '14.—*Piper methysticum* (*Piperaceæ*) from the Polynesian Islands. Is used by natives as a sialogogue and to make a fermented drink, *v. infra.* Contains an essential oil, two resins and about 1% of a neutral principle Methysticin, allied to Piperin. A bitter tonic, nerve stimulant and diuretic. Has been used for gonorrhœa, gout, and cystitis, but of doubtful utility against gonococcus. Extract, hydro-alcoholic. *Dose.*—5 to 10 grains. **Liquid Extract,** *B.P.* '14. 1 in 1 of alcohols 90 and 45%. *Dose.*—30 to 60 minims. The exhaustion with weak alcohol after percolating with strong alcohol is wrong as the extract on evaporating the weaker alcoholic percolate is insoluble in the reserved percolate.—H. Deane, P.J. i./15,622. Pill = 3 grains extract. *Dose.*—1 to 3 or 4. Infusion, 1 in 320. *Dose.*—½ pint. Though more palatable, it is not equal to copaiba or santal oil. Is a local anæsthetic to tongue and eye.

Liquid Extract of Kava-Kava, 20 to 30 minims suspended in Glycerin or mucilage, useful in bacteriuria, even when there are chronic inflammatory changes in the renal pelvis or bladder. A dermatitis is sometimes produced by it, but is exceptional and its possibility should not deter one from trying it.—J. Orr, Pres., Sept. '27,292.

The intoxication produced by the drink in question is wholly unlike that of alcohol, being of a silent or drowsy character accompanied by incoherent dreams.—U.S.D.

Kino (*B.P.* '14). U.S. X. *Dose.*—5 to 20 grains. The dried juice from trunk of *Pterocarpus Marsupium* (*Leguminosæ*). Partly soluble in water, almost entirely in alcohol 90%, nearly insoluble in ether. Astringent for diarrhœa, and as **Trochisci** for relaxed condition of the throat. Its powder is also insufflated to check epistaxis. **Tincture,** 1 in 10 of a mixture of Glycerin, Alcohol and Water. U.S. 1 in 10 of equal parts alcohol (94·9% vol.) and water. *Dose.*—30 to 60 minims. Then tincture may gelatinise, due to an enzyme in the drug. Instead add Kino 2 to Boiling Water 10 and keep at 100° C. 12 hours. After cooling add Alcohol 10 and set aside 12 hours. Kino is a cheap source of Tannin.—P.J. ii./03,702. ***Incompatible*** with mineral acids and alkalis and with substances precipitable by the tannin it contains.

The constitution of Kino Tannin, with list of references to the literature relating to Kino.—A. McGookin and I. M. Heilbron, Jl. Ph. & Exp. Ther., Jan. '26,421.

Butea Gum.—Bengal Kino may be used to replace in certain parts of the Empire.

Krameriæ Radix. Rhatany Root (*B.P.* '14). The dried root of *Krameria argentea* (Para) and *K. triandra* (Peruvian). Both contain about 8% of a tannin. Astringent in relaxed throat, also in tooth powders when gums are liable to bleed, and in mouth washes, also for bleeding from nose and bowels, and for diarrhœa. **Tincture** (*B.P.* '14). 1 in 5 of 60% alcohol by percolation. *Dose.*—30 to 60 minims. Should yield 5% extractive. *Flavoring.*—Glyl Menthæ Viridis vel Piperitæ, Glyl Pini; Glycerin, Syrupus Aurantii. **Trochisci** are made with the Extract, as also $\boxed{\mathfrak{B}}$ $\boxed{\mathfrak{P}1}$ with Cocaine Hydrochloride $\frac{1}{20}$ grain.

Kukui Oil. *Syn.* Candle Nut Oil from New Zealand, Fiji, Hawaii, etc. obtained from the seeds of *Aleurites Tribola. Syn. A. Moluccana* (in Index Kewensis)—in amount equal to 60·8 per cent of the decorticated nuts or 19·8 per cent. of the unshelled seeds. Sp. Gr. 0·920—0·9274, S.V. 184—204·2, I.V. 114·2—163·7. Medicinally it has cathartic properties. Suitable for soap, varnish making and other uses. Dries more quickly than linseed oil.

Labdanum. *Syn.* Ladanum, the exudate from *Cistus var.* was employed in the war by the Greeks for wounds.—Sir Charles Ballance, L. i./20,5.

Lachnanthes Tinctoria.—Spirit Weed, Red Root. A tincture = 1 in 10 of proof spirit of this United States plant: is used to check the cough in phthisis. *Dose.*—1 to 10 minims. **References to Alabone's treatment by Lachnanthes: 17th Edn., p. 805.**

Lactose. — Saccharum Lactis, $C_{12}H_{22}O_{11},H_2O$ = 360·192. Milk Sugar. *Dose, ad lib.* Used for weakly children. Is said to be a useful addition to Magnesia as a laxative, it increases the solubility of the latter by combination. **Preparation on commercial scale.—Y.B.P., 1913,139.**

The organisms capable of fermenting Lactose are less frequently present in normal mouths than those in which dental caries exists. In the latter the Lactose fermenters are invariably present—a point which must have some bearing on the etiology of dental caries.—Sir Kenneth W. Goadby. International Medical Congress at Budapest. Annus Medicus, L. ii./09,1896.

Diabetics assimilate it in some cases with limited improvement.

Mucic Acid. $C_6H_{10}O_8$ = 210·08. Heat in a large vessel Lactose 1 and Nitric Acid (sp. gr. 1·3) 3 (by weight) for 20 minutes. On cooling the acid crystallises out as a white powder. Wash with a little water. It melts at 213° C. to 214° C. and is soluble 1 in 300 of water.

Laminaria Digitata, 'Sea Tangle.' From this seaweed '**Laminaria Tents**' are made for gynæcological and surgical use. Placed in contact with moisture these swell to three times their original size in dry state. The Laminaria is sterilised by drying after immersion in acetone, chloroform or alcohol 90% under pressure at 133° C., or by placing in Saturated Solution of Iodoform in Ether or in Sublimate Solution.

Lappa, Burdock. Roots of *Arctium Lappa,* Linné, or other species of Arctium. On the Continent called Bardana, *e.g., Inf. Bardanæ Spirituos* (external): Bardana 2, water (boiling) *q.s.* to 15, strong alcohol 5, to be rubbed into the scalp. Ph. Notes. Denmark. **Liquid Extract,** 1 = 1 by Diluted Alcohol. *Average dose.*—30 minims. In skin affections and gout.

The use of a tincture of the seeds has largely replaced that of the root in U.S.A., especially in the treatment of psoriasis, acne and prurigo.—C. & D. i./25,216.

Lasiosiphon (*Lasiosiphon Meisneri*). ***Dose.***—2 to 5 grains.

The root of this South African drug resembles Mezereon in its properties (there are several species—this is considered the most active). The bark of the root when chewed produces a scorching sensation, due to acrid resin, n about fifteen minutes. Tincture of the root 1 in 10 Alcohol 90%. *Dose.*—0 to 60 minims. Found efficacious in chronic skin affections. **Liquid Extract.** 1 = 1. *Dose.*—2 to 5 minims. **Lasiosiphon Bassorin Paste,** onsisting of the Liquid Extract thickened with 3% Tragacanth; may be of service for local use. **Lathyrus Sativus.**—A poisonous horse pea.—P.J. ./13,795.

Lathyrism and other plant poisons.—B.M.J. ii./25,847.

Lauri Fructus.—*Laurus nobilis* (*Lauraceæ*). The ripe fruit, Laurel or Bay Berries, contains fixed 30% and volatile oil 1%. In rheumatism.

eptandrin.—*Dose.*—¼ to 2 grains. A resinoid powder obtained from Culvers Root, *Leptandra* (*Veronica*) *Virginica* (*Scrophulariaceæ*). Supposed o promote the flow of bile without irritating the bowels; useful in dyspepsia. Acts well with podophyllin. **Liquid Extract.** 1 = 1 of Leptandra by diluted alcohol. *Average dose.*—15 minims. Solid Extract (Powder form, = 4) of drug by concentrating same and adding Glycyrrhiza. *Average dose.* —4 grains.

Levisticum officinale.—Lovage. A decoction in milk (a fresh leaf and stalk to a quart), allowed to simmer 2 hours. *Dose.*—3 to 5 ounces. For renal dropsy.

Limonene.—*Dose.*—10 to 20 minims (on sugar or in water).

This Terpene exists in several modifications, the *dextrorotatory* ($[a]_D = +106{\cdot}8^\circ$) s contained in Lemon, Bergamot, etc., Oils, the *lævo* ($[a]_D = -105^\circ$) is in Pine Needle Oil and Peppermint Oils. *Inactive* Limonene (= Dipentene—*i.e.* + and —Limonene in equal amounts) is contained in Oil of Camphor, Swedish and Russian Terpentine Oil, etc. They do not differ greatly in taste and odour.

Limonene has been used in place of Turpentine Oil both by inhalation and nternally. Stated to be of value in pulmonary disease associated with copious expectoration, *e.g.*, purulent bronchitis, bronchiectasis, gangrene and hthisical cavities. As a deodorant of foul smelling expectoration it is said o act well. Sputum decreases in amount. The substance is also valuable s a stomachic and externally in stimulating liniments.

Lemon Syrup. Two 'rough' formulæ: Lemon Oil 1 minim, Alcohol 0% 20 minims, Syrup to ½ ounce. Garsed suggests to dissolve Citric Acid 2 n Lemon Tincture 5, strain if necessary, and add Syrup 50; *vide* also *infra.*

Tinctura Limonis.—We have found the following formula of P. Boa equal n flavour to the B.P. formula, as follows: Fresh Lemon Peel, cut small, 5, alcohol (90%) 52 and distilled water 48 mixed. Prepare by maceration. This, is, therefore, weaker in spirit than the usual. For Syrup of lemon.—itric acid 4 ozs., sugar 5½ lbs., distilled water 42 ozs. or *q.s.* tincture of lemon s above 5 ozs. Heat the water to boiling, add first the sugar, then the citric cid, and stir till dissolved. When cold add the tincture of lemon, and nix by shaking. Finally, add distilled water *q.s.* to make to 100 ozs. This yrup we find as good as if not better than the B.P. Syrup. The taste is harper—it is somewhat stronger in Acid, we found by titration about 25% tronger. *For Oleum Limonis vide Vol. II.*

Tinct. Limonis Fort. B.P.C. contains little A or C Vitamin, but contains lmost as much B as Yeast.—S. G. Willimott and F. Wokes, P.J. ii./26,184.

Cortex Limonis B.P. found to contain appreciable amounts of Vitamin.— . G. Willimott and F. Wokes, P.J. ii./25,164.

Linum.—Seeds of *Linum usitatissimum* (*Linaceæ*). Decoction, 1 in 20 emulcent or crushed for use as a poultice. Contains **Oleum Lini,** 30 to 40%, p. Gr. 0·930 to 0·940 I.V. not less than 170. Used as enema and with limewater as Carron Oil. *q.v.* **Flax Seed** or Linseed (*Grains de Lin* in France). n habitual constipation. One teaspoonful to be taken floating in a tumbler f water before breakfast. Appears to act better than Agar-Agar. Tung il from *Aleurites Fordii*, irritant and poisonous, is a substitute for Linseed il.—Lewkowitsch gives particulars.

Liquores Concentrati. Introduced into the B.P. ('98) to replace commercial oncentrated decoctions and infusions. One with 9 of water gave the correponding infusions and decoctions. Commercially the strength is 1 to 7. ee Index.

Lonicera Periclymenum—Common honeysuckle and *L. xylosteum* (fly oneysuckle).—(*Caprifoliaceæ*) Flowers or berries are poisonous.

Lupulinum. (B.P. 1898). *Dose.*—2 to 5 grains in pill. Yellow powder—upulinic-glands—separated from the strobiles of the hop—*Humulus Lupulus* *loraceæ*). Aromatic and bitter, and contains the properties of the hop—

the resin and volatile oil.—Naylor. In insomnia and for alcoholism. Inhalation 30 grains to a pint of warm water. Has been used in gastro-intestinal diseases—enteric and dysentery. Should be fresh. 5 to 15 grain doses. Stimulates the general and local circulation, and improves the tone of the alimentary tract by its digestive properties.—**Tincture** (P.B. 1898). *Dose.*—½ to 1 drachm. Dried strobiles 1 in 5 alcohol (60%). Mose aromatic is made from fresh hops. Extractive varies greatly—standard of 4% was suggested. **Smoking** the dried strobiles has a somniferous effect. **Liquid Extract.** *Dose.* 5 to 15 minims. An alcoholic extract, 1 = 1. **Solid Extract** by concentration. *Dose.*—2 to 6 grains.

Kent Hops contained 2·4% Tannin and 7·9% Ash, Choline, traces of a volatile alkaloid, *l*-Asparagine, Essential Oil and Resinous matter 14%, Potassium Nitrate and Sugar.—P.J. i./13,845.

Hop-growing industry. Kent had 16,260 acres, Sussex 2,420 acres under cultivation in 1925.—F. G. Hobart, P.J. ii./26,323.

Lycoperdon giganteum.—Puff Ball. Forms a soft and comfortable surgical dressing. The dusty powder is a powerful hæmostatic.

This and other fungi as styptics. History of and uses. Heating in an oven to render aseptic does not reduce its hæmostatic power. Troublesome bleeding after tooth extraction can be stopped with it. It is not poisonous.—B.M.J. i./13,437.

Lycopodium. The yellow spores of the **Clubmoss** *Lycopodium clavatum* (*Lycopodiaceæ*), a fine powder. As a pill powder, also as a diluent for insufflations for the throat and ear, and as a dusting powder. When ignited it explodes with a flicker. **Tincture.** *Dose.*—15 minims to 1 drachm. Lycopodium first soaked in ether and dried 1, Alcohol (90%) 10. To stop frequent micturition, and irritation of the bladder. In our knowledge a case has received great benefit after Salol, Helmitol, Bismuth, etc., had been found useless. Use of in quantitative microscopy.—T. E. Wallis, B.P. Conf., 1919 Collection of Lycopodium in Poland.—P.J. i./23,64.

Maidis Stigmata.—*Syn.* Corn Silk. The thread-like stigmata of nearly ripe maize fruit. Are demulcent and diuretic. Used in cystitis, and nocturnal incontinence of urine. **Liquid Extract,** *dose,* 1 drachm. Infuse corn silk 1,000 twice with water *q.s.* to cover. Evaporate liquor to 400. Cover and add cold water 300, allow to deposit, filter and evaporate to soft extract. Of this 1, with water 10, gives a clear solution. A *Syrup* may be made of Liquid Extract 1, Simple Syrup to 10. On Foods cultivated by the natives in Portuguese West Africa. An interesting summary divided according to their natural orders—Maize is the principal one.—Jl. Trop. Med. May 1, 1907.

P1 **Maidis Ustilago.**—Maize Ergot, Corn Ergot. Is used in parturition in place of ergot. *Dose.*—15 to 60 grains. **P1** **Fluid Extract,** ½ to 2 drachms

Manaca.—A portion of the Brazilian root *Brunfelsia hopeana Benth.* (*Solanaceæ*) which has been used in rheumatic affections. Experiments have shewn it to act on the glands, especially the kidneys. **Liquid Extract** 1 = 1. *Dose.*—10 to 30 minims thrice daily.—N.S.D. It is frequently combined with Salicylates as in the following—a proprietary preparation. **Elixir Manaca** and **Salicylates**; each ounce equals Manaca 80 grains. Sodium Salicylate 64 grains, Potassium Salicylate 32 grains, Lithium Salicylate 8 grains. *Dose.*—1 to 2 drachms.

Mandragora. Mandrake. *M. Autumnalis* (*Solanaceæ*).

The root is often forked and is sometimes similar to the human body in shape. It is poisonous with effects allied to belladonna. Contains an alkaloid.

Much confusion exists over the name Mandrake. The Mandrake, as pharmacists understand the Museum specimens, is to be associated with *M. officinarum* L. (this includes two varieties, *α vernalis*, *β autumnalis* = 'European' Mandrake.) *English*, or false, 'Mandrake' is *Bryonia dioica*. *American* Mandrake is *Podophyllum peltatum*. Mr. E. M. Holmes was good enough to assist with the above, in determining the type of 'Mandragora' to be used for whooping cough, as suggested by a French writer (H. Leclerc, Bull. Gen. Therap., 1925, 176,78 per Y.B.P., 1925, 182). The assumption is that *B. dioica* was really needed.

Mandrake found inefficient in preserving youth.—B.M.J. ii./19,762,802.

Manna, U.S. X. *Average dose.*—½ ounce. Saccharine exudation from *Fraxinus Ornus*, Linné (*Oleaceæ*), and other species. In flattish, somewhat three-edged pieces. Soluble with some residue about 1 in 3: about 1 in 600

Alcohol 90%. Contains **Mannitol** (*syn.* Mannite, P. Ital., Ph. Ned. V.) on-fermentable sugar which does not reduce Fehling's Solution), $C_6H_8(OH)_6$ 82·112, to extent of 74% and Dextrin about 20%. Has mild laxative perties. The author has suggested this sugar as an ingredient for an ection of Quinine; *v.* 'Quinine-Mannitol.'

Maranta. *Syn.* **Arrowroot Starch,** from *M. arundinacea* (*N.O. rantaceæ*) is in some slight demand as an article of diet. 1 tablespoonful the pint of hot water produces a demulcent mucilage. Florida Arrowroot m Zamia Floridana, A. De C. *N.O. Cycadaceæ.*—T. E. Wallis, C.D. 1923, 378.

Marrubium.—Horehound. Dried leaves and flowering tops of *Marrum Vulgare,* Linné (*Labiatæ*). *Average dose.*—30 grains. Given in lung ections—has tonic properties. Infusion 1 in 20 of boiling water.

Mastich (P. Belg.), yellow brittle resinous tears obtained from *Pistacia iscus* (*Anacardiaceæ*): insoluble in water, but partly in Alcohol 90%; o soluble in Ether 2 in 1 and in Chloroform 2 in 1, also readily in Acetone. ohol Mastichi, R.D.H.—Mastich 2, Alcohol 90% 1; dissolve. Harvard uid is similar; this is employed for covering a cottonwood dressing so as form a temporary dental covering, *e.g.*, during the treatment of canals h an antiseptic such as Formosyl. **Æther Copal** is R.D.H. (Copal Solun).—Copal 1, Ether 1, dissolve. For covering cement fillings to protect m the saliva. Zanzibar Copal is a fossilised resinous body obtained from *chylobium Hornomannianum* (*Leguminosæ*); *Vateria indica* (*Dipterocare*), Indian; the Brazilian is from *Hymenæa* species and other plants. Auslian Copal is Gum Kauri, *q.v.*

Microscopic Varnish. Mastich ½ ounce, Caoutchouc 15 grains, Chlorom 2 ounces; macerate and filter. Mastix is official in P. Belg.

Ph. Form. supplies an account of the use of this and other Resins in the nufacture of varnishes, polishes, lacquers, stains, etc.

Constituents of Loango, Sierra Leone and Benin Copals.—P.J. ii./10.41.729.

Benzo Mastiche. *Syn.* **Mastisol.**—A solution of Mastich in Benzol (with er ingredients) for wounds, for general surgical use, on the battle-field and major and other operations, etc.—B.M.J. ii./12,976.

t is stated to act as a harmless disinfectant by arresting the micro-organs on the skin, etc., where applied—virtually entangling them. Its action apid and quite painless, excepting for a temporary burning sensation when t applied. There is no danger of eczema which has resulted with use of line. The asepsis produced is absolute. ***Method of use.***—In wound atment the temporary first aid bandage, if any is removed and even if od-smeared, is painted straight away with a sufficient covering of the paration, and then a dressing applied. Slight injuries may have a layer sterile gauze first to draw off the wound secretion. Previous washing, infecting with soap, Alcohol, etc., is not required. Useful in burns and rosions of the 2nd and 3rd degree, the whole area being painted over and vered with cotton wool.

A solution of Mastich 20 in Linseed Oil 1 and Chloroform 50 for treatment operation wounds has been used.

Heusner's Glue. Resin (commercial) 50, Venice Turpentine 5, Methyed Spirit 50, Benzene 25. For applying extension in fractures. Also eful substitute for Mastisol.—C. Max Page, B.M.J. ii./17,290.

The following have also been suggested:—

(1) Dammar 250, Castor Oil or Linseed Oil 30, Benzol 700, Sodium Bicarnate 50, Amyl Acetate a few drops. Set aside for several days with shaking d strain.

(2) Colophony Resin 300, Venice Turpentine 20, Castor or Linseed Oil 10, nzol 700, Sodium Bicarbonate 60, Amyl Acetate a few drops.—K. Dieterich, J. i./15,100. See also B.M.J. i./25,441, and Mencière's Solutions.

Spiritus Adhesivus Resinosus. **P. Svec. X.** Terebinthina (*i.e.* Common ankincense from *Pinus* var. esp. *P. pinaster*—Solander) 7·5, Colophony esin 18·5, Alcohol (90%) 4.

Pistachia Lentiscus Oil (**Mastich Leaf Oil**) contains Pinene and, obably other Terpenes. Has an odour resembling Rue and Savin Oils.

Melaleuca Viridiflora (*Myrtaceæ*).—Indigenous to New Caledonia.

✱**Gomenol** (T.M. 215925), a French proprietary, is stated to be a distilled ence of; given in rhinitis, laryngitis, and other diseases of the respiratory system. **Pates Pectorales au Gomenol** are also made. In influenza bronchitis, and coryza and with Vaseline Oil as Ear Drops.—Ph. Notes.

Melissa Officinalis (*Labiatæ* 'Balm' was in U.S., 1890, Eau de Melisse des Carmes. *Syn.* Alcoolat de Mélisse composé, Fr. Cx. German *Carmeliter Geist.* Spiritus Melissæ Compositus; digestive; twenty to twenty-five drops twice a day, is also used as an application in rheumatism, etc. For history see Edn. XVIII., p. 842.

Mentha Piperita (*Labiatæ*) **Peppermint.**

Oleum Menthæ Piperitæ is distilled from the fresh flowering plant, rectified if necessary. Sp. Gr., 0·900 to 0·920. Soluble 1 in 4 of 70% alcohol. Should contain at least 50% menthol, free and combined, and not less than 5% of esters (calculated as methyl acetate) **Spiritus.** (*B.P.* '14) 1 in 10 alcohol 90%.

The annual sales of the English oil are said to be many times more than the amount actually produced. The Japanese oil comprises about 80% of the world's supply.—Finnemore.

In coryza the use of this oil instead of menthol is advised. Warm a few drops and inhale. It removes headache from pressure in the frontal sinuses. Continue treatment after the nose has become clear and do not allow the passage to become obstructed again for some hours.

It has been confirmed radioscopically that Peppermint, and in a lesser degree Fennel and Chamomile, has a sedative effect on the stomach and a mild stimulating effect on the intestines.—P.J. ii./26,680.

Oil of Peppermint increases bile secretion; oil of Thyme does not. A 50% solution of camphor in Ethereal oils produces paralysis of the bile ducts for a long time; a 20% solution in Oil of Peppermint produces paralysis for a short time, followed by polycholia.—per Jl. A.M.A. ii./25,711.

Menthæ Viridis Oleum, is distilled from fresh flowering Spearmint.

Forms a clear solution with an equal vol. of 85% alcohol, the solution becoming turbid on further dilution. (The turbidity is noticeable with a double volume of alcohol.—W.H.M.) Soluble 1 in 3 of 90% alcohol.—*B.P.* '14.

Menyanthes trifoliata. *Syn.* Trifolia Fibrina.—Bogbean Leaves or Buckbean. Are bitter tonic, emmenagogue, antiscorbutic, vermifuge and febrifuge: large doses are purgative and emetic; contain Menyanthin, a glucoside. Infusion 1 in 20. *Dose.*—2 to 6 ounces, taken hot, early in the morning daily, useful for functional amenorrhœa. Liquid Extract with Liquorice, 1 in 2. *Dose.*—½ ounce. The leaves are in P. Dan.

Mesembryanthemum var., N.O. *Aizoaceæ.* A specimen submitted to us from South Africa (1927) showed the presence of a minute quantity of alkaloid, with Mayer's Reagent, and a small amount of Tannin. Glucosides absent. A preparation of the plant has a local reputation in phthisis. A tincture 1 in 10 of the dried plant in Alcohol 60% was prepared. *Mesembryanthemum crystallinum* is the well-known ice-plant of the gardens.

Methyl Chloridum CH_3Cl = 50·481. This gas made by distillation of Methyl Alcohol, Sodium Chloride, and Sulphuric Acid is supplied compressed in cylinders. As local anæsthetic it is valuable in neuralgia, sciatica, rheumatism. Spray the part for 5 or 6 seconds only.—If effect too strong, apply Glycerin.

Beet Molasses contain 10% of nitrogenous matter and on distillation with Lime yield Methyl Alcohol and Trimethylamine. The latter on treating with Hydrochloric Acid under pressure at 350° C. yields Methyl Chloride which is used in dye manufacture and for refrigerating.—Martin's Industrial Chemistry, Organic, 1912,376.

Methylene Chloride. CH_2Cl_2=84·931, used as anæsthetic in Germany under the name of 'Solaesthin.' Unsuitable for complete narcosis, but may be used to relieve the pains of labour by a process of intermittent administration.—Pres., Sept. '23,319. See also B.M.J.E. i./25,18.

Mezereum. *Dose.*—8 grains. Dried bark of *Daphne Mezereum* (*Thymelaceæ*) and other species. Contains a crystallisable substance (Daphnetin), which is isomeric with Æsculin (*q.v.*). Has been used as an epispastic for many years, and stimulant.

Mollinum. *Syn.* **Salve Soap - Unna.** Prepared by boiling Lard 400 with Caustic Potash 56 in Water 400 and Alcohol 90% 40. Allow to stand 12 hours at 50—60° C., then add Glycerin 150. A white soap, containing about 12% excess of fat. As a basis for ointments for rapid absorption. It is readily washed off with water, with which it forms a lather. It leaves the skin fresh and supple, and makes no grease spots on linen. **Mollinum Hydrargyri** and **Mollinum Potassii Iodidi** contain 33% and 10% respectively of mercury and potassium iodide. Not incompatible with mercuric chloride. Is used with respectively 3 to 5% of phenol and salicylic acid and thymol, and with birch tar 10 to 20% for psoriasis; with 30 to 50% of sulphur or 10% of storax for acne and scabies;—with 5% of chrysarobin or naphthol; and with 10% of ichthyol, resorcin, iodoform, naphthalene or Ⓟ white precipitate.

Monsonia ovata. A Cape Geranium. Is closely related to and used in same manner as Geranium Maculatum.—N.S.D. A South African plant used as a native remedy for dysentery. Tincture, 1 in 8, Alcohol (90%). *Dose.*—1 to 4 drachms every 3 or 4 hours. Liquid Extract 1 = 1. *Dose.*—10 to 30 minims.—In dysentery with excellent result. Must be used fearlessly as to dose. Effectual in 3 days where Ipecac. and Bismuth fail.—R. A. J. Asbury, L. ii./15,1318. **Monsonia biflora.** As prophylactic to hæmorrhage in enteric fever at the seventeenth or eighteenth day, contains an active principle *entericin*—neither alkaloidal nor glucosidal. *Dose.*—½ to 4 drachms every 4 to 6 hours.

Mori Succus. — Mulberry Juice. *Dose.*—1 drachm. The juice of the fruit of *Morus nigra* (*Moraceæ*). Mild laxative Used in the form of **Syrupus Mori.** Mulberry juice 20, heat to boiling point and filter Dissolve sugar 36 in filtrate and add Alcohol 90% 2½ to the liquid.

Moschus (B.P. 1898). Musk. *Dose.*—5 to 10 grains. The dried secretion Grain Musk from the preputial follicles of the musk deer, *Moschus Moschiferus* (*Ungulata*). This is believed to be wrong—the Secretory Gland is a *special* Gland.—*cf.* Fr. Cx. A useful nerve stimulant in cases of exhaustion in fevers and blood poisoning. Of value both for nervous excitement or nervous collapse. Is effective in obstinate hiccough and infantile convulsions. **Mistura Moschi.**—Musk 5 grains, Gum Acacia 5 grains, Syrup of Orange 1 drachm, Rose Water to 1 ounce. Tincture, 1 in 20 Alcohol 50%. *Dose.*—1 drachm. A Tincture of Artificial Musk has been used in whooping cough. In cardiac failure of acute pneumonia it has been given with camphor in pill. We have known 10 grain cachets to be successful in pneumonia.

A powerful heart stimulant. 1 grain with 1 grain quinine in a pill every four hours. Worth trying in influenza.—A. Ransome, B.M.J. i./19,307.

The odour of Musk is due to muskone $C_{15}H_{28}O$ or $C_{16}H_{30}O$.—Thorpe, 1912, Vol. III, 553.

The butyl derivatives of many aromatic nitro-hydrocarbons are sold as **Artificial Musk**. Musk Baur, trinitro-meta-butyl toluene $C_6HCH_3(NO_2)_3C(CH_3)_3$, is formed by nitrating m-butyl-toluene with fuming nitric and sulphuric acids.—Thorpe, 1912, Vol. I., 586.

Muira - Puama.—This drug, which comes from Brazil, has been described as belonging to *Liriosma Ovata*, Miers (fam. *Olacaceæ*). It is said to contain an alkaloidal crystalline substance (we could not confirm this), an amorphous bitter substance, a little fat, and two kinds of resinous acids. Brazilian drugs vary however. It has an irritating action, also tonic aphrodisiacal properties. Used in nervous disorders.

Pilula Potentin Composita—*Martindale*, contains Muira Puama Extract 1 grain with Ovolecithin 1 grain. A useful nerve stimulant and aphrodisiac. *Dose.*—3 to 6 per diem before meals.

Myricin. *Dose.*—2 to 5 grains. The powdered extract of *Myrica Cerifera*. An astringent and stimulant, and in large doses, emetic. For diarrhœa and jaundice.

Myristica, Nutmeg (*B.P.* '14). *Dose.*—5 to 15 grains. Dried seed of *Myristica fragrans* (*Myristicaceæ*) with testa removed. Aromatic and carminative. Contains **Nutmeg Oil.** *Syn.* **Oleum Nucis Moschatæ.** *Dose.*—½ to 3 minims. Colourless or yellow with Sp. Gr. 0·870 to 0·925. Soluble in 3 volumes of 90% alcohol. Has properties representative of the seeds. The expressed or concrete oil of nutmeg of yellowish colour contains Myristicin $C_{12}H_{14}O_3$ = 206·112. It is occasionally employed as a gentle local stimulant. **Spirit of Nutmeg.** *Dose.*—5 to 20 minims. Notes on the various forms of Mace of commerce.—Holmes, P.J. ii./08,652. Poisoning by nutmeg—three cases. —B.M.J. i./09,1005. Although Oil of Nutmeg and Mace only cause fatal poisoning in a rabbit in doses of 10 to 12 Gm., and a single nutmeg is capable of producing serious effects in man, it should be remembered that Oil of Nutmeg is very variable, some containing hardly any myristicin. The narcotic property of Nutmeg is attributable to myristicin, and it appears from experiments on animals that this substance when associated with the other constituents of nutmeg is more readily absorbed than when in the pure state. The lower animals are much less sensitive to the direct action on the cerebral function than man. Nutmeg does not appear to contain any other substance of physiological action on animals.

Linimentum Myristicæ L.H.—Oil of Nutmeg 1, Olive Oil 3.

Terpeneless Nutmeg Oil, 1 is about equivalent to 5 of the original Oil.

Ceratum Nucistæ. *Syn.* *Muskatbalsam.* **Stomachic Balm.** Yellow Wax 2, Arachis Oil 1, Oleum Myristicæ 6, melted together and strained and moulded into tablets—used for rubbing abdominal region in infants (Hager).

Myrrha (*B.P.* 14). *Dose.*—5 to 20 grains. Yellowish or reddish gum resin from *Commiphora Myrrha, Off.* (*Balsamodendron Myrrha*, B.P. '98), and other species. Soluble in water to the extent of about 50% (forms whitish emulsion on trituration with), the remainder being mostly soluble in alcohol 90%. It is soluble in alkalis, *e.g.*, Potassium Carbonate. A favourite constituent in mouth washes, *e.g.*, Tincture of Myrrh and Borax, 1 of each in Eau de Cologne 20. Nitric acid should give with genuine myrrh a transparent dirty yellow liquid. False myrrh may give a bright yellow solution and bdellium is not dissolved. **Tincture** (*B.P.* '14) 1 in 5 alcohol 90%. *Flavoring.*—Glyl or Syl Menthæ Piperitæ or Lavandulæ ; Extractum Glycyrrhizæ Liquidum.

For description of the literature of Myrrh, *see* E. M. Holmes, P.J. ii./13,116.

Myrtillus (*Vaccinium Myrtillus*).—Bilberry or whortleberry, the Blueberry of Canada. An extract or jam has been employed with good results in dysentery, and has been painted on the tongue in stomatitis. It is said to be of great value in typhoid, rendering the intestine aseptic. Suppositories containing 1 Gm. of the extract, and a liquid extract 1=2 of bilberry are prepared. An enema is also used. *Dose.*—2 ounces p.d. The fruits are in P. Austr. In chronic colitis the preserved juice and the liquid extract of the berry are excellent.—G. W. Major. **Myrtol.**—A constituent of myrtle oil ; has been recommended in putrid affections of lungs and air passages. Expectoration lessened, but no effect on bacilli. *Dose.*—5 to 15 minims on sugar. **Capsules** contain 2 and 5 minims.

Myrtillin prepared from Blueberry Leaves by extraction with Alcohol 6% and the protein removed by precipitation occurs as a yellowish white powder freely soluble in water. It has been given *per os* to build up tolerance when the blood and urine have been made normal with Insulin or diet, and although less prompt, powerful and certain than Insulin it deserves clinical trial.—F. M. Allen, L. ii./27,18.

P1 **Narceina.**—$C_{23}H_{27}NO_8,3H_2O$ = 499·272. *Dose.*—$\frac{1}{8}$ to 1 grain. An Opium Alkaloid soluble in alcohol, hardly in water. Hypnotic sedative of doubtful utility. P1 **Narceine Hydrochloride** is in Ph. Ned. V. P1 **Narcyl** is Ethyl Narceine Hydrochloride $C_{25}H_{31}NO_8HCl$ = 509·721. *Dose.* divided, up ro 1 grain per diem. White crystals, analgesic, slightly stimulant —not hypnotic. Action is similar to morphine but is not largely used in medicine.

Nasturtium Officinale (*Cruciferæ*). *Syn.* **Watercress.** Held in considerable repute for supposed medicinal virtues, *e.g.* in treatment of chlorosis of young girls, and in ulcers, for centuries past. Xenophon advised Persians to feed children on watercress to improve growth. Animal experiments confirmed improvement of growth. Striking improvement in general condition and in amelioration of chronic constipation in patients fed on watercress in Poor Law Institutions. Found to have retarding effect on growth of experimental cancer; suggested due to Vitamin content, but more probably some other factor.

A glucoside, in the form of a Potassium salt, found present in plant, yielding on hydrolysis a thiocarbamide and a naturally-occurring base, β-phenylethylamine. The latter has been prepared synthetically in form of a yellowish volatile liquid of intensely alkaline reaction, and converted into hydrochloride in form of a whitish buff-coloured powder readily soluble in water and neutral reaction, 0·25 Gm. of which is innocuous in mice *per os*, but subcutaneously 0·02 Gm. fatal for mice and guinea-pigs. Further investigations proceeding. Also contains Vitamins A, B, and C. and salts of Potash and Iron and considerable amount of Iodine.—S. Monckton Copeman, P.J. ii./25,386.

Succus Nasturtii Officinalis. *Dose.*—2 to 4 drachms.
The fresh juice of the plant, obtained by thoroughly pounding and pressing
ut with 1 of Chloroform added to 400 parts, or in hot weather 25% Spirit.
ontains the bulk of the Chlorophyll of the leaf, also salts of Potassium,
ron and Iodine. See also an interesting experiment on the subject of pre-
rvation, p. 506.

P1 *†**Nicotina.**—*Syn.* PYRIDYL-METHYL-PYRROLIDIN. $C_{10}H_{14}N_2$=162·128
os. — $\frac{1}{8}$ to 1 grain. Colourless liquid (Sp. Gr. 1·011) volatile alkaloid
larkens in time) from Tobacco (*Nicotiana Tabacum*). The content may be
om 0·5 to 5% combined as Malate or Citrate. *Manufacture.*—Dissolve
mmercial Tobacco extract in water made strongly alkaline with Caustic
oda and extract with Petroleum Ether. Shake out latter with Dilute Sul-
huric Acid. Make this acid liquid alkaline with Sodium Hydrate and again
tract with Petroleum Ether. Distil off and rectify the alkaloid in a current
Hydrogen.—P.J. i./13,357. ***Uses.***—Has been used hypodermically for
tanus. *Antidotes.*—Emetics, stomach-pump, Tannic Acid (small quantities
peatedly) stimulants.

POST ENCEPHALITIC PARKINSONISM treated by nicotine. Tobacco was used
ternally and externally for relaxing muscular action in various forms of
sease years ago. Cases which may benefit are those where voluntary
uscular control is intact but movement is hampered by excessive plastic
ne. By depressing and subsequently paralysing the sympathetic nerves
ith nicotine one attempts to eliminate the plastic tone and free the limbs
om spasticity. Nicotine base is used. Signs of intolerance are nausea,
inting, tachypnœ, and are watched for. Patient is kept in bed. In two cases
s followed. Initial dose $\frac{1}{30}$ grain *ter die.* If no appreciable change in pulse
art, the dose was increased to $\frac{1}{10}$ or $\frac{1}{5}$ grain *ter die.* Immediate results
disputable.—H. Moll, B.M.J. i./26,1079.

1 Infusum Tabaci 1 in 20 has been ordered as an ingredient in a hair lotion
us—Cantharides Tincture 3, Sal Volatile 3, Lavender Water 3, Tincture of
rophanthus 2, Glycerin 2, Tobacco Infusion (1 in 20) *q.s.* to 64.—B.C.D.
15,363.

References to Tobacco.—Toleration to nicotine. Normal animal tissues
ve the power to destroy a small quantity of the alkaloid nicotine. The
ssues of animals which have been rendered tolerant to nicotine destroy a
nsiderably larger amount. There is evidence to show that the destruction
the nicotine is not due to a chemical combination with the tissues, but that,
the contrary, it is brought about by ferment action.—W. E. Dixon. Some-
hat similar toleration is that of Alcohol and Morphine—these become oxidised.
-Na., Mar. 16, 1911, p. 101.

The action of Nicotine and other pyridine bases upon muscles and on the
tagonism of Nicotine by Curarine.—Nature, Mar 17, 1910, p. 87.

Perfusion of the heart with Nicotine, animal experiments.—L. ii./17, 759.

Nicotine nearly equals adrenalin in power of raising blood pressure. To-
cco must be barred where raised high tension indicative of danger.—Brunton,
ii /08,1132. The influence of Tobacco as cause of arteriosclerosis. *cf.* p 579.

The *Lancet* Laboratory conducted an enquiry into the toxic factor in
bacco. There is difficulty in estimating Nicotine in presence of Ammonia.
the method employed Nicotine was separated from the latter by means
Iodine. Pipe mixtures contained the largest amount of Nicotine (2·04 to
85%), Egyptian, Turkish and Virginian cigarettes came next with 1·38 to
8%. A British cigar contained less (1·24%) and a Havana cigar least of
l (0·64%). The cigarette (from any tobacco) yields least of its Nicotine to
e *smoke*, while the pipe yields a very large proportion (70 to 80% in some
ses) of its Nicotine to the smoke reaching the mouth of the consumer. Cigar-
te smoke contains, however, Furfural (a harmful substance) especially the
eap Virginian cigarettes—this is practically absent in the smoke both of
e cigar and pipe. Further the cigar, pipe and Egyptian and Turkish cigar-
tes all yield Ammonia, which is an antidote to Furfural and Aldehydes
nerally (see also L. i./10,662—Thiocyanates). The cheap Virginian cigar-
tes contain very little Ammonia. (It must be further remembered that it

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* Agricultural and Horticultural Poison. See note under Arsenic.

† **P1** "*Tobacco and any preparations or admixtures (other than for smoking or
uff) containing the poisonous alkaloids of Tobacco.*"—*Added Mar.*, 1925, *cf*,
isons Acts.

is so often the cigarette smoker who is guilty of excess.)—L. i./12,944; ii./12, 547,1823. For percentage of Nicotine in Tobaccos see also B.M.J. i./09,911.

The view is expressed that there must be some other toxic effect in Havana cigars as, though the Nicotine content is low, they are not tolerated so well as the mild British cigars.—L. ii./12,1511.—See also *ibid*, 1410

Tobacco 100 Gm., as cigarettes, yield when burnt in conditions approximating those which occur in smoking: HCN 0·08 Gm. Pyridine 0·146 Gm., Nicotine 1·165 Gm., NH_3 0·36 Gm., ***Carbon Monoxide*** 410 Cc. (No CO is produced in *Opium smoking*).

Ordinary Virginian tobacco, from which cigarettes are made, contains weight for weight nearly twice as much Nicotine as Manila cigar tobacco, but when burnt during smoking the smoke from the cigar contains more than twice the amount of Nicotine as that from the cigarette.

Generally speaking, most of the Nicotine in smoking is destroyed during combustion. A smoker never forms a very strong craving, but were he to inject his Nicotine the tale might be different. Carbon Monoxide poisoning liable to occur from cigarettes in excess. All the symptoms are in evidence in the man who smokes 20 cigarettes a day.—Prof. Dixon, B.M.J. ii./21,819; L. ii./21,1071.

Carbon Monoxide in tobacco smoke. The amount varies according to rate of smoking. In general, a normal sample of cigarette smoke will contain between 0·5 and 1% of CO. A cubic foot of straight coal gas contains as much CO as 4 cigars. CO may apparently replace oxygen in the blood without serious harm.—Prof. H. E. Armstrong, B.M.J. i./22,992.

Anti-cigarette League in Chicago made some exaggerated statements *re* Cigarettes.—L. ii./21,927.

Chronic Nicotine poisoning from tobacco on the arteries, heart, eyes, etc., far worse than Opium and Cocaine evil—probably victims number 1,000 to 1 of the latter.—W. V. Furlong, B.M.J. i./22,862.

Tobacco (a well-known and popular cheap brand) dust, used as snuff, found to contain 0·66% of solid *Cannabis Indica*, caused poisoning symptons.—R. L. E. Downer, B.M.J ii./23,521. See also Lieut.-Col. W. S. J. Shaw *ibid.* 586 and T. F. Hugh Smith *ibid.* 590.

Tobacco smoke is powerfully germicidal containing *inter alia* Pyridine a potent germicide. It rapidly destroys the cholera vibrio During an epidemic of cholera in Hamburg not a single workman engaged in the cigar factory was attacked by the disease. Later it was stated amongst 5,000 cigar makers only eight cases and four deaths from cholera occurred. Tobacco smoke also destroys the bacilli of pneumonia.—L. i./13,406.

Nicotine is as toxic as Potassium Cyanide. A cigar weighing 6 Gm. and containing 5% Nicotine kills, if eaten. 100 cigarettes smoked in one day may cause death. About one-third of the nicotine contained appears in smoke, and much is left in the last part of the cigar. Moist tobacco is worst, no Nicotine being destroyed.—per Jl. A.M.A. ii./25,314.

Denicotinised Tobacco. Analyses by the *Lancet* showed that the Nicotine, with one brand, has been reduced by 10 to 20%. Physicians are warned not to recommend denicotinised Tobaccos without further evidence than manufacturers' assurance, since in Germany some samples were found to have more than the normal content of Nicotine.—L. ii./25,32.

German view of Nicotine. German brands of so-called Nicotine-free cigars gave upwards of 420 and 320 mgr. per 100 Gm.—presumably in smoke. Nicotine deadly to adolescents.—Prof. Kionka, L. i./26,563.

Medical Aspects of Tobacco—a good historical summary. A 'drug of addiction' only in a humorous sense but hardly accurate. Psychological tests on medical students show that smoking lowers mental efficiency in 10 to 23%, especially in imagery, perception and association. Effects on the heart described. Effect on athletics doubtful. The irritating effect on the throat ascribed variously to Furfurol, Pyridine and Ammonia—not to Nicotine. —Sir H. Rolleston, L. i./26,961.

The Effects of Tobacco Smoking.

(*a*) On the digestive system.—Sir H. Rolleston; (*b*) From the nervous and mental aspect.—Sir R. Armstrong Jones; (*c*) The physiological effects.—Prof. W. E. Dixon.—Pr., Jan. '27,1-28. See also W. E. Dixon on the habit. B.M.J. ii./27,719.

128,000,000 lbs. of tobacco are consumed here every year. There is marked physical deterioration of the Dutch people. The consumption of tobacco in

Holland per head has trebled in the last 50 years and is now eight times as reat as that of the average European.—B.M.J. ii./26,265.

P1 **Nicotine Salicylate.** $C_{10}H_{14}N_2.C_6H_4OH.COOH = 300{\cdot}176$. White crystals reely soluble in water. 1% Ointment in skin affections useful.

P1✱'X.L. All' (T.M. 350770 cl. 3). Fumigator contains Nicotine 37·3%, Camphor 34·3%, Alcohol 15·1%. *It is an Agricultural and Horticultural Poison. See note under Arsenic.* Has caused poisoning. Use of Spray, Fumigant and Paste.—P.J. ii./08,722.

A Solution of one ounce of Nicotine in ten gallons of water is used as an nsecticide for hop-spraying—500 gallons are used per acre. It is the best nsecticide as it kills apple and plum aphides. It is also used as a sheep dip. —C.D. The addition of Saponins to Insecticide Emulsions is an advantage.

Ocymum Viride (*Labiatæ*). **Basil Plant** so called **Mosquito Plant**—was hought to have repelling effect on Mosquitoes. Others say that it neither epels nor attacks, in fact the mosquitoes just ignore its presence. The oil rom New Caledonia plant contained 18% Phenols, all Thymol (P.R. '24,43), while Oil from West Africa contained 32 and 52% Thymol, to which effect may be due.—P.R. '24,48.

Œnanthe Crocata (*Umbelliferæ*). Water dropwort—the most dangerous nd virulently poisonous of all British native plants. It contains no lkaloid. Contains yellow essential oil with unpleasant odour and a viscid esin, nearly 3%, giving rise to convulsions by acting on the spinal medulla. The stem has poisoned children, being mistaken for Angelica. The roots esemble parsnip and are not unpleasant to the taste.

Oleum Crotonis (*B.P.* '14.). *Syn.* **Oleum Tiglii, U.S. X.** *Dose.*—½ to 1 minim. FR. CX. gives max. single dose 0·05 Gm. (= 1 minim approx.). Max. during 24 hours 0·1 Gm. (=2 minims nearly). Expressed from seeds of *Croton Tiglium* (*Euphorbiaceæ*). Sp. Gr. 0·940 to 0·960. *Soluble* in Ether and in Olive Oil. A powerful skin irritant, will blister, and even cause suppuration and scarring. It has been found possible to immunise animals to the poisonous ffects of Croton Oil by gradual increasing dosage of 'Crotin,' Has been mployed for tinea. The **Liniment** well diluted may stimulate growth of hair on bald patches. Also used as a counter-irritant, but may produce powerful nflammation. In pneumonia of great benefit. Internally so violent a purgative that it is rarely given except to lunatics for obstinate constipaion, and in cases of apoplexy (one or two drops placed on the back of the ongue). May be given as Compound Castor Oil Capsules. *q.v.* ***Antidotes.***—Olive Oil or milk as diluent. Opium to relieve pain and irritation.

Oleum Crotonis Compositum. Mix Blistering Liquid B.P. 6 drachms and Almond Oil 1 ounce. Allow Acetone to evaporate and add Croton Oil 40 minims. Used as a paint once a week in whooping cough—a success.—W. J. Midelton, B.M.J. i./23,746.

ABOR ARROW POISON is believed to be a paste made by pounding the soft parts of Croton Tigilium: refs. 17th Edn.

Croton Gubouga.—Has a reputation in the Eastern Transvaal as a remedy or malaria. The seeds and bark have been used. Prof Greenish, P.J.ii./18. p. 289, found an acrid constituent. An acid, 4-Hydroxyhygric acid isolated. —J. A. Goodson & H. W. B. Clewer, J. C. S., Aug., 19, p. 923.

Oleum Croton Elliottianus, TO BE CALLED 'OLEUM ELLIOTT' to disinguish from Croton Oil. *Dose.*—1 to 3 minims. *Capsules* are prepared containing ½ minim in each. *Dose.*—Two capsules at night for laxative effect. *It must be given in capsules*—three to five for purgative effect.

The oil of the seed of this East African plant has Sp. Gr. at 15° C. 0·9242 to ·9246, Acid value 15·5 to 15·9, Saponification No. 188·5 to 189·4, Iodine Value 143·0 to 147·5. The yield of oil from the seed is about 30%.

Further on medicinal action, see J. Theodore Cash and W. J. Dilling, Jl. Pharm. and Ex. Therap., Vol. VI., No. 2, Nov., 1914, and our Edn. XVIII. p. 847.

Oleum Graminis Citrati (*B.P.* '14). INDIAN OIL OF VERBENA or LEMON GRASS.—Distilled Oil from entire herb. Carminative, with agreeable odour contains Citral, Citronellal, &c.—E.P.I. i./243.

Oleum Rhodii.—The source of 'Lignum Rhodii' of the older writers has never been accurately determined. One writer says the wood was brought rom the Canary Islands, *e.g.*, the wood of *Convolvulus Scoparius* and *Convolvulus Floridus.* Another suggestion is, that the wood used was *Genista Virgata* or *G.* (now *Cytisus*) *Canariensis.*—E. M. Holmes, P.R., Feb., 1911.

Oleum Rosæ. *Syn.* **Otto or Attar of Rose.** Distilled from the fresh flowers of *Rosa damascena* (3,000 yield 1). *For Characters and Tests, see Vol. II.* **Rosettol.**—An artificial Otto with distinct odour of roses, probably more penetrating than the natural oil. It is entirely free from Stearoptene, *i.e.*, is fluid at ordinary temperatures. **Liquor Rosæ Dulcis.**—Otto of Rose 8 drops, Carmine 2 drachms, Potash Solution ½ ounce, Alcohol 90% ½ ounce, Glycerin to 10 ounces. Ph. Form uses Syrup, but we find glycerin much better—no deposit. Useful for scenting and colouring pharmaceutical and toilet preparations. **Pulvis Rosæ Compositus.** *Dose.*—Ad libitum. Oil of Rose and Chloroform of each 1 (or combined 4 drops), Acacia 145 (grains), Sugar 840 (grains), Solution of Carmine 13 (drops). Useful to dilute powders such as Calomel, Grey Powder and Jalapin, also to colour and flavour mixtures—¼ or ½ ounce in 6 ounces. **Unguentum Aquæ Rosæ** (*B.P.* '14). *Syn.* CERATUM GALENI: UNGUENTUM GALENI; COLD CREAM. White Beeswax 18, Almond Oil 61, Borax 1, Rose Water 20, Otto of Rose 0·1.—E. W. Lucas, B.M.J. ii./13,1013.

Oleum Sesami. *Syn.* **Benné Oil, Gingelli Oil, Teel Oil.** Expressed from *S. indicum* (*Pedaliaceæ*).

Saponification No. 189-193, and Iodine No. 103 to 114. Samples examined varied between 87 and 110. It has Sp. Gr. at 15° C. 0·920-0·924. Solidifying point 4° C. It does not readily turn rancid, is easily saponified even by cold process, is a semi-drying oil, neither gummy nor sticky, readily absorbed. It is thinner than Cotton Seed Oil.

It may be used instead of Olive Oil in various parts of the Empire.—*B.P.* '14. It has been employed for making ophthalmic solutions of alkaloidal bases washed with half its volume of strong alcohol to free from fatty acids. It is then sterilised at 120° C. for half an hour. **Emulsio Olei Sesami.** Sesame Oil 600 Gm., Water 300 Cc., Solution of Sodium Hydrate (Sp. Gr. 1·33) 6 Cc. *Dose per diem* 2 to 3 ounces. Used by Prof. Arloing in the treatment of diabetes.—Pr., June, 1911.

Origanum Majorana (Sweet Marjoram) and **O. Vulgare** (French Codex, Common Marjoram) (*Labiatæ*) have been used medicinally. Value is attributed to the essential oil contained as an aromatic tonic.

A number of varieties of Origanum are distilled in various parts of S. Europe. Full data Edn. XVIII. p. 848. Carvacrol occurs to the extent of 80% in some, whilst Thymol preponderates in Thyme Oil. The latter in commerce is often called Origanum Oil.

As a remedy against ***hookworm infection, Carvacrol*** has been suggested in U.S.A. Its cost (made from Turpentine) would be low. It is liquid at body temperature, hence would come in close contact with the intestinal wall. Experiments showed it has about same toxicity as Thymol.—A. E. Livingston, Hyg. Lab. U.S. Pub. H. Serv. Abst., C.D., June 24/22,817.

Pœonia Officinalis. The red peony of the gardens. The root has acid taste. The Greeks possibly used it as a wound-dressing—Sir Chas. Ballance. L i /20,5.

Pareira (B.P., 1898). *Average dose.*—30 grains. Dried root of *Chondrodendron tomentosum*. *Uses.*—Similar to those of Buchu. Employed in chronic inflammation of the genito-urinary tract. **Extractum Pareiræ Liquidum** (B.P., 1898). *Dose.*—½ to 2 drachms. Extract the Pareira Root in No. 40 powder with boiling water. Evaporate the liquor until it contains 33⅓% extractive matter. Add to 3 volumes of such, Alcohol 90% to produce 4. For *Greenish's formula—vide* P.J. ii./04,701. Examination of the root alkaloids, Beberine and others *see* Arch. Pharm., 250, 684.

Passiflora Cerulea. Tincture made by macerating the crushed flowering herb in an equal weight of 90% alcohol used in insomnia. *Dose.*—30 minims at bedtime. The leaves contain a notable proportion of Prussic Acid.—H. Leclerc Bul. Gen. de Therap., P.J.ii./20,220.

Patchouli—Genuine Patchouli is from Pogostemon Patchouli (Bell *Labiatæ*. The yellow volatile oil is contained in the glands in the epiderma cells, in the hairs and in the central leaf tissue. The chief supplies of the leaf come from the Straits Settlements, and recently from the West Indies Description of various Patchoulis of Commerce.—Java from Pogostemo Heyneanus, Khasia from Microtæna Cymosa, Chinese M. Robusta, etc Contains Cadinene 40 to 45% and Patchouli Alcohol.—E. M. Holmes.

Pepo, U.S.—Ripe seed of *Cucurbita Pepo* (*Cucurbitaceæ*), Pumpkin. *Averag dose.*—1 ounce. Said to be a good remedy for tapeworm, given before breakfast, followed by coffee d later a brisk cathartic. The oil ggested.—

B.M.J. i./09,71. but the opinion is expressed that any value that the seeds may possess when given in substance in this way must be attributed to mechanical action.—Am. Jl. Ph., Oct., 1910, 484.

Phaseolus Radiatus.—The fruits called by the Malays Katjany-idgo beans have been used in beri-beri. The beans when used to add to rice have an unpleasant flavour. They are boiled into a porridge with the rice in the proportion of ⅓ pound (150 Gm.) of beans to 1⅓ pounds of rice. The rice should, if possible, be freshly husked daily. Quinine may be given with it if needed.

Phlorbizin, $C_{21}H_{24}O_{10}2H_2O = 472{\cdot}224$. *Syn.* PHLORIDZIN. A glucoside from various rosaceous trees, in pinkish-white crystals, sparingly soluble in water, in alcohol 90% 1 in 4, and in ether, and induces artificial diabetes (glycosuria) in doses of at least 15 grains. The drug is a valuable mild tonic suitable for children; a substitute for quinine. *Dose.*—Tonic 5 grains, Antiperiodic, 15 grains. Diminished Phloridzin glycosuria indicates disease of the kidney, and complete absence of sugar should be regarded as a sign of advanced renal disease.—L. i./07,717, see also *Vol. II.*

Phytolaccin. *Dose.*—1 to 5 grains. Extractive from *Phytolacca Decandra,* Poke Root (*Phytolaccaceæ*).—U.S. VIII. Has emetic, cathartic and alterative properties. Has been used in rheumatism and syphilitic affections. A tincture 1 in 10 alcohol 45%. *Dose,* 3 to 10 minims. **Fluidextract, U.S., VIII.,** 1 = 1 by Diluted Alcohol. *Average dose,* Emetic 15 minims; alterative 1½ minims. Locally for painful mammæ.

Pichi.—Leaves and twigs of *Fabiana imbricata*; useful in gravel and some kidney diseases. **Liquid Extract.** *Dose.*—10 to 60 minims. Has given good results in gonorrhœa and cystitis and complications.

Picrorhiza (*B.P.* '14).—*Dose.*—10 to 60 grains. Dried rhizome of *P. kurroa.* (*Scrophulariaceæ*). Tonic, antiperiodic, aperient.—This and Amphicome Emodi are called Kaur. Inferior to quinine.—I.D.C. **Extractum Liquidum.** *Dose.*—15 to 60 minims. 1 in 1 Alcohol 60%. **Tinctura.** *Dose.*—½ to 1 drachm. 1 in 4 Alcohol 45% (was 1 in 8).

[P1] **Picrotoxinum** (B.P. 1898). $C_{45}H_{50}O_{19} = 894{\cdot}4$.
Dose.—$\frac{1}{100}$ to $\frac{1}{25}$ grain. FR. CX. *Max. single dose.*—$\frac{1}{32}$ grain, max. during 24 hours $\frac{1}{10}$ grain approximately. A neutral crystalline principle obtained from the fruits of *Anamirta paniculata* (*N.O. Menispermaceæ*)—or Cocculus Indicus (growing on the Malabar Coast); does not form salts. Nearly entirely soluble 1 in 330 of water, and 1 in 13 of alcohol 90%, and about 1 in 500 of fats: its taste is bitter. The substance is thought to be a compound of Picrotoxinin with M.pt. 201° C. and Picrotin 249° C. The combined substance melts at about 200°. Lævorotatory, $a = -29{\cdot}26$ at 16° C. (Absolute alcoholic solution of 4·1 Gm. in 100 Cc.).—FR. CX.

Gives good results in checking night-sweats (does not like Atropine cause dryness of the throat), also employed in epilepsy and chronic alcoholism: overdoses cause stupor, delirium, and convulsions (by acting on the medulla). It increases the secretion of the mucous and perspiratory glands. Its action in checking night sweats is explained by Cushny as probably due to its increasing the respiration and thus preventing that stimulation of the nervous mechanism of perspiration which occurs through the partial asphyxia.

Antidotes.—Administer emetics, use the stomach tube, then give Chloral and Potassium Bromide, then stimulants

Ⓟ **Hypodermic Injection.**—1 in water 360. *Dose.*—3 to 6 minims.

Ⓟ **Liquor.**—Picrotoxin 1, Glacial Acetic Acid 30. Dissolve and add Distilled Water to 250. Filter. *Dose per os.*—2 to 12 minims in water. Is palatable and keeps in solution at all temperatures.

Ⓟ **Pills** of $\frac{1}{30}$, $\frac{1}{50}$, $\frac{1}{60}$, or $\frac{1}{100}$ grain form suitable doses for checking night-sweating of phthisis taken for 2 or 3 nights successively. The drug is slightly cumulative, may thus be temporarily stopped with effects persisting. A pill of Picrotoxin $\frac{1}{60}$ grain, Atropine $\frac{1}{120}$ grain with Agaricin $\frac{1}{12}$ grain, is said to act even better.

In addition to the body Picrotoxin which occurs in the seed only, the tasteless alkaloid Menispermine has been found in the pericarp of the fruit.

Structure of Cocculus Indicus. **Sections of fruit and seed.—T. E. Wallis, P.J. i./21,306.**

Pimento (Allspice). Dried full-grown unripe fruit of *Pimenta officinalis Myrtaceæ*). From W. Indies. **Oleum Pimentæ.** *Dose.*—½ to 3 minims

Sp. Gr. 1.030 to 1·055 O.R., 0° to—4°; R.I. 1,508 to 1,535; Soluble 1 in 3 of 70% alcohol. Eugenol content not less than 60% by volume.

Stomachic. and antispasmodic.—Put into hollow teeth to relieve pain.

A snuff composed of Powdered Pimento with addition of 3 minims of Eucalyptus Oil to the ounce is advised for hay fever to promote a healthy discharge of pituitary mucus in which the pollen grains are killed and washed away. The allspice is a local stimulant and antiseptic—the latter quality being accelerated by the co-operation of the Eucalyptus Oil.—J. Sawyer, B.M.J. ii./10,16.

Pimento Leaf Oil contains 89% Eugenol. The start of an important industry in Jamaica. By the fermentation of the leaves the oil spontaneously changes into iso-eugenol, the half-way product in the preparation of Vanillin. The wild Pimento trees of Jamaica could therefore compete with the growers of cloves in Africa or Cinnamon in Ceylon from the Vanillin producing point of view.—C.D., 20,1253. See also P.J. i./26,326.

Pinus Canadensis.—The hemlock spruce of the U.S.A. *Syn.* Abies Canadensis. A fluid extract is used as an astringent in leucorrhœa; and given internally for diarrhœa, hæmoptysis, and night sweats. *Dose.*—10 to 60 minims, also a distilled colourless variety in commerce.

Pinus Strobus. White Pine of America—the Syrup of the bark in that country enters frequently into Cough Syrups.—L. ii./09,203.

Piperina. $CH_2O_2.C_6H_3.CH:CH.CH:CH.CON.C_5H_{10} = 285·160$. *Dose.*—1 to 10 grains. A crystalline principle from black and long pepper, the fruits of *Piper nigrum* and *Piper longum* (*Piperaceæ*) in large colourless prisms, which turn yellow with keeping. Melts at 130° C. (266° F). Insoluble in water, soluble in alcohol, and less soluble in ether. At first tasteless, but on prolonged contact it develops biting taste; it has febrifuge, stomachic and antiperiodic action. **Oleoresina Piperis.** *Average dose.*—½ grain. Is prepared by acetone extraction of pepper.

Piscidia Erythrina. Jamaica Dogwood (where it is used as fish poison) Extractum (Alcoholic) from the bark. *Dose.*—2 to 5 grains, and Liquid Extract 1=1. *Dose.*—20 to 120 minims. In neuralgia, toothache, bronchitis, pertussis, insomnia, and dysmenorrhœa.

Pistoia Gout Powder.—One formula says composed of Calumba and Patchouli only. Several authorities, however, give (which is more often used) Bryony Root 2½ drachms, Gentian 2½ drachms, Chamomile 2½ drachms, Colchicum Root 5 drachms, Betony Root 10 drachms. Mix and divide into 365 powders. *Dose.*—1 to be taken each day of the year in a full glass of hot or cold water.—Ph. Form. Have also been advocated for rheumatism.

Platinum. Pt. = 195·2 Sp. Gr. 21·5. This metal is capable of being heated to very high temperature without melting. It resists all acids except Aqua Regia and is hence used to make analytical apparatus. **Platinic Chloride** $PtCl_4 2HCl + 6H_2O = 518·054$. Precipitates Ammonium and Potassium from Solutions. Solution of Platinic Chloride (*B.P.* '14) is 5% in water. Has been given in syphilis in ⅛ to ½ grain doses. **Potassium Chloroplatinite** K_2PtCl_4. Crystals soluble in water. Used in photography in acid toning baths. **Potassium Chloroplatinate** K_2PtCl_6 is almost insoluble. It is the compound resulting in Potash Estimations.

Rhotanium. An alloy of the rare metals with properties similar to those of Platinum. Used for making crucibles, dishes and the like, for analytical laboratory purposes.

Polygonum Hydro-piper L. (*Polygonaceæ*) WATER PEPPER. Has been used for dropsy and the allied *P. Aviculare* for difficulty in passing urine—both have some action on the kidneys.—L. i./11,281.

Populin.— Benzoyl-Salicin, $C_{13}H_{17}(C_7H_5O)O_7 + 2H_2O = 426·208$. From *Populus tremuloides* (*Salicaceæ*). *Dose.*—1 to 4 grains. Has antipyretic properties. A simple way of producing synthetic Populin.—P.J. ii./04,233.

Primula Obconica causes acute dermatitis in susceptible persons.—A. J. Hall.—L. i./21,427. Dermatitis venenata produced artificially by rubbing Primula Obconica leaves into the scarified skin.—R. Cranston Low, B.M.J. ii./21,559. See also A. Whitfield, L. ii./21,61.

Pruni Virginianæ Cortex. *Syn.* WILD CHERRY BARK.

The bark of *Prunus serotina* (*Rosaceæ*) contains amygdalin; on distillation with water it yields an essential oil rich in hydrocyanic acid; on moistening the bark with water, the odour of the latter is developed (*vide* also Amygdala Amara). It possesses bitter tonic properties, with more or less sedative ones. The preparations in use—the tincture and syrup—are used to palliate the cough in phthisis, pertussis and bronchitis, in palpitation of the heart, and debility of the digestive organs. The Syrup is also a useful flavouring agent. Ⓟ**Tincture** (*B.P.* '14). *Dose.*—30 to 60 minims. Virginian Prune Bark, approx. 1 in 5. 10% Glycerin approx. used as an addition. Ⓟ**Syrup** (*B.P.* '14). *Dose.*—½ to 1 drachm. Virginian Prune Bark, 15%.

Ⓟ**Syrupus Benzaldehydi Hydrocyanicus.**

Dose.—½ to 1 drachm. Saturate Distilled Water 10½ with Benzaldehyde dissolve Sugar 15 in the liquid, and add 0·01 per cent. of Hydrocyanic acid. Except for the colour, which could be adjusted, this preparation corresponds closely to the Syrup of Virginian Prune.—Rutherford Hill.

Psyllii Semina.—The small dark brown seeds of *P. pulicaria* from S. Europe. The testa contains a large amount of mucilage. A **Mucilage** or **Decoction,** 1½% is employed in France as a demulcent drink similarly to the Ispaghula preparation in India. The seeds are used for correcting constipation like Agar Agar and Linseed.

Pterocarpi Lignum. Red Sander's Wood. *Syn.* **Santalum Rubrum** U.S. X. Heart-wood of *Pterocarpus santalinus* (*Leguminosæ*). Contains santalin, and is used as a colouring agent in compound tincture of lavender.

Pulegium. Pennyroyal (*Labiatæ*). Oleum Pulegii, Oil of Pennyroyal. *Dose,* 1 to 3 minims Sp. Gr. 0·927 to 0·962 Rotation +13° to +35°.

It comes from Spain, S. France and Algeria, and contains 80% Pulegone.—Encourages menstruation—administered in form of a hot tea at bedtime. Is reputed to produce abortion. This is distinct from the oil passing under that name in U.S. VIII., *i.e.,* **Oleum Hedeomæ** from *Hedeoma Pulegioides* (*Labiatæ*) indigenous in N. America, which has similar properties. It is similar in composition.—*ibid.*

Poisoning by Essence of Pennyroyal—4 drachms taken—caused delirium and Camphor taste in the mouth. Hot tea given produced profuse vomiting. As a general treatment give an emetic and avoid Alcohol.—B.M.J. ii./13,746.

For *midge bites* the following is claimed to be both preventive before going out or may be rubbed into the bites when inflicted to allay itching. Ol. Pulegii ½ drachm, Tinct. Absinth. (1 in 8) 3 dr., Lin. Saponis, Lin. Camph. Ammon. of each equal parts, to 3 ounces. *Aqueous* solutions give little relief as they do not penetrate the skin.—L. i./13,1783.

Pulque is the fermented sap of *Agave Americana* and *A. Mexicana* (*Amaryllidaceæ*). Contains *inter alia* the phosphates of Magnesium, Potassium, and Calcium, and 7% of Alcohol. It stimulates renal activity, is a powerful nutritive, has been used in Bright's disease, is laxative and diuretic.

On Pulque and Pulque drinking in Mexico. The Maguey (*A. Mexicana*) flowers once in seven or ten years. Description of method of cultivation and collection of the juice with process of fermentation. The Pulque is drunk in Mexico city like beer in this country. Consumption is stated to be about 2 quarts of fresh juice per day per head. It cannot be transported any distance. It contains about 4½% Alcohol.—C.D. i./10,54. L. i./12,43.

Succus Agavæ Concentratus. *Syn.* **Agmel.**

Dose.—½ ounce in half tumbler of water three or four times a day between meals. Maguey juice in a concentrated condition. Indicated in forms of acute and chronic congestion of the kidneys—in nephritis and in disease of the bladder and urethra. It is stated to have marked power in correcting and altering metabolism and in restoring kidneys to health and active function. Activity thought to be due to certain enzymes.

Aguamiel Ph. Mex. V. is from the stem of *Agave salmiana,* in which inflorescence has been prevented by cutting off the flowering parts. Popularly used as an antiscorbutic and in the treatment of gonorrhœa.

Pulsatilla.—*Anemone Pulsatilla* (*Ranunculaceæ*). *Syn.* **Pasque Flower** The entire herb is used. Contains Anemonin, a crystalline substance. **Liquid Extract.**—1 = 1. *Dose.*—2 to 5 minims. Tincture 1 in 10, Alcohol 60%. *Dose.*—5 to 30 minims. In dysmenorrhœa and amenorrhœa.

Dysmenorrhœa relieved by Pulsatilla. Not used in cases where the amount is excessive, lasting six days or more. Most patients were unmarried. The mixture given was Tinct. Pulsatilla 4 drachms, Spt. Chlorof. 2 drachms Chloroform water to 6 ozs. 2 drachms to be taken as soon as menstrual (or pre-menstrual) pain begins and every three hours while pain continues.—F. C. Coley, B.M.J. i./22,13.

Pyrethri Flores. The dry flowers of *Pyrethrum roseum* and *P. carneum* in powder as a dusting powder to keep off insects. Those from Dalmatia are from *Pyrethrum cinerariæfolium* (*Compositæ*). A Tincture, 1 in 4 Alcohol 60%. is used as an insecticide lotion. The powdered drug may be puffed from bellows into the room to kill mosquitoes.

Dalmatian Insect Flower prefers sunny, pebbly, calcareous hill-sides dry and without irrigation and a fairly dry atmosphere. The seed in commerce is apparently dried by heat to prevent germination. Details of culture. Suggestion that it would be worth trying here.—E. M. Holmes, P.J. i./17,7.

Pyrethri Radix.—Pellitory Root (*B.P.* '14), FR. CX. *Average dose.*—30 grains. Dried root of *Anacyclus Pyrethrum* (*Compositæ*). A useful sialogogue, causing considerable salivary effusion; is used in the form of **Tincture** 1 in 5, which might be made with 60% alcohol. Must be given with caution to children, as it is powerful in effect. **Glycogelatin Pastils** are made containing 1 grain of the powder for dryness of the mouth. To promote a continuous flow of saliva and thus irrigate the ducts and so prevent ascending infection. Severe hæmatemesis is often followed by inflammation of the parotid glands. *S. pyogenes aureus* and *M. lanceolatus* found in the pus.—B.M.J. i./09,1297.

Tinctura Pyrethri Composita. Tincture of Pyrethrum (Root) 2, Clove Oil 1, Camphorated Chloroform 1. As tooth-ache drops.—C.D., Oct. 21,16.

Pyridina. FR CX $C_5H_5N = 79{\cdot}048$. *Dose.*—5 to 10 minims daily increased. A colourless alkaline liquid Sp. Gr. 0·980 with persistent odour, miscible with water and alcohol, boils at 243° F.; obtained from many organic substances by dry distillation; is contained in and combined with nicotine in tobacco smoke. It is probably the relieving agent of various cigarettes and powders smoked or burnt for asthma and whooping cough. A drachm of it is placed on a plate in a small room in which the patient remains from 20 to 30 minutes three times a day. Is employed for making Denaturalised Alcohol.—*See* Alcohol. It is stated to be less toxic than nicotine.

Quassia (*B.P.* '14).—Jamaica Quassia. Wood of *Picræna*, or *Picrasma excelsa* (*Simarubaceæ*). Contains picrasmin. Infusion 1 in 100. Chiefly employed as a bitter tonic. *Flavoring.*—Syl Vanillæ, Syl Rosæ; Syrupus Zingiberis. **Liquor Quassiæ Concentratus** 1 in 10. **Tincture** 1 in 10. Alcohol 45%. By rectal injection the daily use of a strong infusion will get rid of tapeworms and threadworms. *Surinam Quassia* (not now in use) is the wood of *Q. amara* (U.S.), a branching shrub, whereas *P. excelsa* is about 100 feet high. **Extractum Quassiæ**, U.S. VIII., aqueous extract made up with mile sugar. (Powder form 1 = 10 of drug.) Quassia is free from tannin, hence compatible with iron preparations as tonic.

Ⓟ **Lotio Quassiæ.** Concentrated Quassia Infusion 1 ounce, Spirit of Rosemary 1½ drachms Sassafras Oil 30 minims, Alcohol 2 drachms, Liquefied Carbolic Acid 2 drachms, Water to 6 ounces. Shake before use. For nits in children's hair.—P.J. i./11,88. The wood contains **Quassin,** $C_{10}H_{12}O_3$ (?) = 180·146, which forms lamellar crystals, soluble about 1 in 400 of water, soluble also in acid and caustic alkaline solutions. Increases secretion of salivary glands and kidneys, and stimulates digestion. *Dose.*—1/30 to 1/3 grain.

Quassia Suppositories containing ¼ grain Extract with gelatin basis (15 minim size) are prepared. These have been found valuable for removal of thread worms in young children. Infantile fits in hospital practice are often due to worms. These suppositories are simple and convenient to use in comparison with Enemata. The strength may be increased.

Quassin, FR. CX. has formula $C_{32}H_{42}O_{10} = 586{\cdot}336$. *Max. single dose.*—1/16 grain. Surinam Quassia differs slightly from Jamaica Quassia. Threadworms have been discharged on the third day by 2 grain Quassia Extract Pills (Keratin coated)—one morning, noon and night. Previously 2 ounces of compound decoction of Aloes.

Anti-smoking Gum.—Quassia made up in form of a chewing gum—a substitute for smoking for the use of patients suffering from tobacco amblyopia who feel the loss of their tobacco. Finely ground Quassia 1 in gum mass 12 is not too strong for excessive smokers, particularly if there be an alcoholic complication. Where this is absent 1 in 20 is strong enough. It creates appetite.

Quebracho (*Aspidosperma Quebracho*) Bark from Argentina contains $\boxed{\text{P1}}$ Aspidospermine supplied as $\boxed{\text{P1}}$ Sulphate $(C_{22}H_{30}N_2O_2)_2H_2SO_4 = 806{\cdot}592$. Tonic, febrifuge and antispasmodic. *Dose.*—1/64 to 1/32 grain. Much larger doses, *e.g.*, 1 and 2 grains, have been given *per os* and hypodermically.—

N.S.D. In heart affections with dyspnœa. Ⓟ Tincture of Quebracho 1 in 5 lcohol 60%. *Dose.*—1 drachm. Ⓟ Liq. extract 1 = 1. *Dose.*—10 minims.

Quebracho Bark is subject to considerable variation. Examination of a ample submitted.—G. R. A. Short, P.J. i./26,103.

Red Quebracho Bark recognised as distinct in the Index Kewensis. Conains distinct colouring matter in the heart-wood. Physiological examination eeded. Used in making Tannin Extract.—E. M. Holmes, P.J. i./26,4.

Quillaia saponaria (*Rosaceæ*). (*B.P.* '14). *Syn.* Panama Bark (Soap Bark). Contains quillaic acid, $C_{19}H_{30}O_{10} = 418·335$ and sapotoxin, $C_{17}H_{28}O_{10}$ $= 408·224$, closely allied to saponin. Has a sweetish but acrid after-taste and possesses emulsifying properties, causing frothing in water in which it has een macerated. Its lather kills pediculi of scalp. Soap-bark has been used s an expectorant in bronchitis, contra-indicated in inflammation of the ntestines or stomach, or ulcerated condition of the mucous membrane. Is used for emulsifying tar preparations. **Tincture** (*B.P.* '14), 1 in 20 of Alcohol (60%). Five minims of this will emulsify 1 drachm of fixed oil. Fluidextract, U.S. VIII. 1 = 1. *Average dose.*—3 minims. The powder has very marked ternutatory properties. Acne Lotion—Decoction of Quillaia 4 ounces, Eau e Paris 60 minims. Ammonia Solution 40 minims. Use night and morning. It has poisonous properties.

Will emulsify Lemon Oil—thus for a 'Syrup of Lemon' take Lemon Oil 1, Quillaia Tincture 1, Water 14, shake and add Syrup 236, also Tolu Balsam; thus for a 'Syrup of Tolu' take Tolu Balsam 6, Fluidextract of Quillaia 1, Alcohol 90% 5. Dissolve and add Syrup 180, shake and filter.

Examination of Quillaia Bark and Commercial Saponins. The Sapogenin assay method is best. J. Cofman-Nicoresti & S. B. Tallantyre, B.P. Conf., 1920.

Ranunculus Ficaria (N.O. *Ranunculaceæ.*) *Syn.* PILEWORT or *Lesser* CELANDINE. This drug has been used in the form of ointment. It is preared by digesting the fresh Pilewort with melted lard 24 hours, and straining fter the manner of Savin Ointment. **Suppositories** are made containing 2 grains of the ointment and 18 grains of Spermaceti; also, more convenient, a smaller size, containing 45 grains of the ointment and 15 grains of Spermaceti; ave been employed in hæmorrhoids. (Advocated by Sir J. Sawyer).

For some historical notes on the drug *vide* L. i./17,42.

Resina (*B.P.* '14).—From the crude oleo-resin of various Pines after istilling Oil of Turpentine. Yellow resin soluble in Alcohol 90%, Ether nd Benzol. **Unguentum Resinæ** contains Resin, Yellow Beeswax, Lard nd Olive Oil. **Ceratum Resinæ** U.S. X. Resin 7, Yellow Wax 3, Lard 10. (CERATUM, U.S. White Wax 3, Benzoated Lard 7.)

Rhei Rhizoma (Radix).—*Dose.*—3 to 10 grains repeated. *Single dose.*—15 to 30 grains. *Rheum officinale* and other species (and the variety *R. Palmatum*, U.S. X.) (*Polygonaceæ*) grown in China and Thibet, partially decorticated and dried. Todaiwo P. Jap. IV. is Chinese Rhubarb. *For Constituents see Vol. II. Flavoring.*—Syl Vanillæ, Glyl Pini. Laxative and stomachic; often given with Sodium Bicarbonate, especially to children. **Extract** made with 60% Alcohol. *Dose.*—2 to 8 grains. **Fluid Extract** 1 = 1 made with Alcohol 75%, approx. *Dose.*—15 minims. **Pilula Rhei Composita** (*B.P.* '14). *Dose.*—4 to 8 grains. Contains Rhubarb, Aloes, Myrrh; Hard Soap, and Syrup of Glucose. **Pulvis Rhei Compositus** (*B.P.* '14), **Gregory's Powder.** *Dose.*—10 to 60 grains. Gregory's Powder, stored in closed bottles keeps indefinitely. Analyses of a number of samples. —J. F. Liverseege, P.J. ii./26,144. **Syrupus Rhei Aromaticus, U.S.** *Dose.*—2½ drachms. Aromatic Tincture of Rhubarb 150, Potassium Carbonate 1, Syrup to 1,000. **Tablets of Rhubarb Soda and Ginger** contain Rhubarb 3 grains, Sodium Bicarbonate 2 grains, Ginger 1 grain. **Tinctura Rhei Composita** (*B.P.* '14). *Dose.*—½ to 1 drachm repeated, 2 to 4 drachms single dose. 1 in 10 of 45% Alcohol flavoured with Cardamom and Coriander. **Tinctura Rhei Aromatica, U.S. X.** *Dose.*—60 minims. Rhubarb 20, Cinnamon 4, Cloves 4, Nutmeg 2, Glycerin 10, Alcohol 50, Water 40.

Acute bacillary dysentery.—Rhubarb ½ teaspoonful of powder in cachets very one, two or three hours, until the rhubarb appears in the stools. Stated to be magical.—R. W. Burkett, L. ii./21,254.

A mixture consisting of Compound Rhubarb Powder 1 oz. (sometimes 2 oz.) nd Chloroform Water to 2 oz., in bacillary dysentery in children, causes rapid isappearance of symptoms, but of no use in adults. *Dose.*—1 teaspoonful every 2 hours to a child of 2 years.—A. Castellani, Int. Conf. Trop. Am., '24,424.

Experiments to determine the nature of the action of rhubarb extract on B. dysenteriæ (Shiga, also Flexner), and the Bacillus No. 1 of Morgan. There was no distinct germicidal action.—H. C. Brown, L. i./23,382.

Rhubarb Leaves—Notes on use of.—L.i./17,708. Poisoning by, *ibid.*, 847. A little powdered chalk added to the leaves would render them safe in cooking. The leaves in a case of supposed poisoning were stated to contain approximately equal parts of Potassium Binoxalate and Calcium Oxalate—10 grains of each in a pound of leaves. The Calcium Oxalate would be inactive. It is doubtful whether 3½ grains—equivalent approximately to ⅓ lb. of leaves—a liberal helping—was the cause of death. A much larger quantity of Oxalic Acid—60 grains has been taken with recovery.—Harrington Sainsbury.—L. ii./17,25. Air dried leaves contain over 0·2% oxalates reckoned as Oxalic Acid with Malic Acid 0·3 to 1·7%.—W. Kirby, P.J. i./17,497; ii./17,11.

Rhus aromatica. (*Anacardiaceæ*) (Sweet or Fragrant Sumach). The bark of this Canadian and U.S. plant contains Tannin and Volatile Oils. *Dose.*—5 to 30 grains has given results in incontinence of urine.—B.M.J.ii./09,752. Said to act on the muscle fibre of the bladder. **Liquid Extract** 1=1. *Adult dose.*—10 to 30 minims. 5 minims thrice daily to children under two years, and 10 minims to children 8 years.

Rhus Glabra, U.S. X. Smooth Sumach Berries (dried, ripe fruit of *Rhus Glabra* Linné). *Average dose.*—15 grains. **Fluidextract**, U.S. X. is a glycero-hydro-alcoholic extract, 1=1. *Dose.*—15 minims (1 Cc.). Diuretic. The bark is also occasionally used as a tonic and astringent.

Rhus Toxicodendron. (*Anacardiaceæ*). *Syn.* **Poison Oak.**—Poison Ivy Leaves. **Tincture** *Dose.*—2 to 15 minims. Imported from North America, prepared from fresh leaves, 1, alcohol 2. Used for rheumatism in chronic skin affections, paraplegia, and incontinence of urine from atony of the bladder. Also for hæmorrhoids. Whitla says it gives satisfaction, but may irritate stomach and bowels.

The poisoning by the 'Toxicodendrol' contained, takes the form of an itching, burning, erythematous and herpetiform rash. For a treatise on skin eruptions of this type see A. Whitfield, L. ii./21,61.

Application of an alcoholic Quinine Sulphate solution recommended.—Y.B.P., '24,341.

'Toxicodendrol' 0·005 mgr. applied to the skin is sufficient to produce local symptoms with pain.—J.A.M.A., per Jl. Trop. Med., June 1/23,208.

Lead Acetate dissolved in Alcohol gives speedy and permanent relief.

Tincture of Sanguinaria Canadensis dabbed on with a soft cloth, is a remedy for the irritation, as also Calamine Lotion.

Compresses of Borax 3%, Permanganate of Potash 1—2%, or 10% solutions of Sodium Hyposulphite or Magnesium Sulphate advised. Lead lotions and ointments should be avoided.—E. A. Sweet and C. V. Grant, per T. D. B. Vol. 17/21,264.

Lacquer dermatitis cured with Rhus toxicodendron Antigen. The lacquer is prepared from sap of *Rhus vernificera.*—C. M. Williams, Arch. Derm. & Syph., Dec. '25,851, per Pres. Oct. '26,351.

Poison Oak Extract successful in the treatment of over 80% of cases of Poison Oak dermatitis.—per Jl. A.M.A. ii./25,1002.

Rosæ Gallicæ Petala (*B.P.* '14). U.S. X. The fresh and dried unexpanded petals. **Confectio Rosæ Gallicæ** and **Infusum Rosæ Acidum** and **Syrup Rosæ** are given. Infuse 15 minutes. **Fluidextractum Rosæ**, U.S., 1=1 Glycero-hydro-alcoholic.

Mel Rosatum P. Jap. III. (now omitted). Macerate Rose Petals 1 in dilute Alcohol 5, 24 hours with shaking, press and mix with the liquor Honey 9, Glycerin 1, and evaporate to 10.

Rubia Tinctorum (*Rubiaceæ*), Dyer's Madder. The root of this plant is known in Germany as **Krapp-wurzel**. A native of Southern Europe and the Levant—cultivated in Holland, etc. A dye stuff yielding Alizarin, Xanthopurpurin, etc., not to be confused with the Indian Mudar (Calotropis). It has been used in amenorrhœa and rachitis.

Rubus Chamæmorus (*Rosaceæ*).—Cloudberry, Norwegian blackberry, marsh or dwarf raspberry. Also grown in Newfoundland. Known in Russia as Moroshka and in Germany as Torfbeere, Maltebeer, Woollenbeere, and Zwerg Maubeere. The leaves of this are diuretic, useful in nephritis, cirrhosis of liver and cardiac affections. Infusion, 1 in 12. *Dose.*—½ ounce; fluid extract, *dose*, ½ to 1 drachm. Fruit is antiscorbutic and used for hæmoptysis, will also abate fever.

Rubus villosus, a species of Blackberry. *R. Idæus* = Raspberry.

Rumex obtusifolius — the dock. — Dried root was found to contain 0·447% of iron. ✱**Ferascol** (T.M. 315389) TABLETS.—A preparation with nucleins as base; contains 3% of iron. Used in treatment of anæmic girls.

Rumex Crispus.—Yellow Dock (*Polygonaceæ*). The root contains Emodin, Chrysophanic Acid and Rumicin,—the last (*Syn.* Rumin) *Dose.*—1 to 4 grains in scrofulous affections, dyspepsia, astringent and tonic. Tincture 1 in 10, Alcohol 50%. *Dose.*—1 to 10 minims. **Unguentum Rumicis.**—Fresh Yellow Dock Root 1, Benzoated Lard 2, warmed two hours and strained. Used like Chrysarobin applications.

Ruta Graveolens—(*Rutaceæ*). *Dose.*—10 to 30 grains. Contains about ¼% Volatile Oil Sp. Gr. 0·880 (consisting of Methyl Nonyl-Ketone $CH_3CO.C_9H_{19}$ and Methyl-heptyl Ketone). *Dose.*—2 to 5 minims. In amenorrhœa and menorrhagia. Large doses have been given to procure abortion.

Confectio Rutæ. *Dose.*—1 to 2 dr. Fresh Rue, Caraway, Bay Berries of each 1½, Sagapenum ½, Black Pepper ¼, Honey 16. Add the first three in powder by degrees to the Sagapenum melted in the Honey with water *q.s.* Carminative and antispasmodic. Sometimes used as enema in infantile convulsions. **St. G. H. has Rue 6, Caraway 6, Bay Berries 6, Black Pepper 1, Asafœtida 2, Honey 64, Water** *q.s.* **180 grains of this with 20 ounces of Chamomile Infusion to prepare** *Enema Rutæ.*—St. G. H.

[P1] **Sabina,** U.S. VIII. *Average dose.*—7½ grains. FR. CX. has this as max. single dose. Max. during 24 hours 15 grains. Tops of *Juniperus Sabina* *Savin*), Linné (*Coniferæ*). [P1] **Oleum Sabinæ.** *Dose.*—1 minim. Has emmenagogue and abortifacient properties.

[P1] **Unguentum Sabinæ,** B.P. '85. Melt Lard 16 and Wax 3 on a water bath, add fresh Savin tops bruised 8 and digest 20 minutes and express through calico. Freshly made is used in conjunction with blisters in rheumatoid rthritis, see Cantharides.

Sagapenum.—*Dose.*—10 to 30 grains. A gum-resin with taste resembling asafœtida, and properties similar to this and galbanum, for use in amenorrhœa and hysteria.

Salep.—Tubera Salep, P.G. VI., Ph. Ned. V. Dried tubers of various species of Ophrydinæ—Orchis mascula and others. (N.O. *Orchidaceæ.*) When fresh have bitter taste. They are immersed in boiling water on collection and dried; contain mucilage and have nutritious and demulcent properties; allay gastro-intestinal irritation. Mucilago Salep 1%, P.G. VI. Freshly made. Salep is much sold in the Indian Bazaars as an article of diet.

✱**Angiolymphe** (T.M. 404338).—*Dose.*—1 to 2 Cc. intramuscularly, daily or every other day for a week or two. After a period of rest, a further series of 6 or 12 injections may be given. A combined extract of Orchis Mascula, Ixia rosea and Morea Sinensis. Assumed to produce its effects in tuberculosis by so modifying the soil 'that a natural resistance is intensified.' An Orchis infusion is known to have sedative effect, also a stimulant effect on the appetite, and to facilitate expectoration. These are claimed to be present in Angiolymphe. Has also been used in lupus. In tuberculosis it is an excellent tonic—appears to help to promote sleep and lessen cough.—Jane Walker, Brit. Jl. Tub., Oct. '24.

Salix nigra.—The bark of this, the black or pussy willow, is used as a sexual sedative, tonic and astringent, and given for gonorrhœa and spermatorrhœa, Liquid extract, 1 in 1. *Dose.*—½ to 1 drachm. *Flavoring.*—Syl Lavandulæ. Solid Extract. *Dose.*—1 to 5 grains. Relieves ovarian pain and nocturnal emissions.

Salvia. Sage (*Labiatæ*). *Dose.*—15 to 30 grains. Dried leaves, aromatic, astringent, tonic.

Sambuci Flores (*Sambucus nigra—Caprifoliaceæ*), Elderberry flowers (B.P. 98). Infusion and pomade are used as domestic remedies for sores, bruises, etc. **Aqua Sambuci** (P.B. '98) is prepared from the fresh flowers (or flowers preserved with common salt), a frequent ingredient in lotions for the eyes and skin. Contains the glucoside Sambunigrin.—E. Bourquelot, B.M.J. /21 59.

Unguentum Viride, St. G. H. Gum Elemi 1½ drachms, Prepared Suet 2½ drachms, Olive Oil 20 minims, Turpentine 40 minims, Copaiba 1 drachm, Green Elder Ointment to 1 ounce (apoth.).

Sanguinaria Canadensis (*Papaveraceæ*). 'Blood Root.' Expectorant, emetic, tonic, for cough. *Average dose.*—2 grains. Ⓟ Liquid extract 1 = 1. *Average dose.*—1½ minims. Ⓟ Tincture U.S. IX. *Average dose.*—15 minims. Sanguinaria Root 10, Hydrochloric Acid 1. Percolate to 100 with a mixture of Alcohol 3 vols. and water 2 vols.

The commercial drug assays 3 to 4% total Alkaloids.

A resinioid Extractive Sanguinarin Dose ¼ to 1 grain is also made.

Sansiviera. The rhizome of *Sansiviera thyrsiflora*, a native of certain parts in South Africa. We examined the root some years ago and found it to contain no alkaloid. The root possesses laxative properties, it is free from griping action, and pleasant to take. The Kaffirs chew a stick of the fresh root at a time, and swallow the juice for use as an anthelmintic, and more particularly for the treatment of hæmorrhoids—for the latter it is known to be efficacious. Should be given in bold doses, as the active constituents only exist in small proportion. **Liquid Extract.** *Dose.*—2 to 4 drachms. Prepared as Liquid Extract of Liquorice. As a laxative. **Solid Extract.** *Dose.*—10 to 20 grains for pills and capsules.—Oliver.

Saponins are toxic glucosides contained in Sarsaparilla and Quillaia, etc.

The word "Saponin" is a collective one implying a group of Nitrogen-free glucosides:—information as to the plant of origin ought to be given. Death from Saponins is preceded by a long incubation period with the symptoms of central paralysis. Fish die when the water they are in contains 1 in 100,000. Saponin in Salt and Carbolic Acid baths is said to aid the action of all drugs which stimulate the skin. The nasal mucous membrane is stimulated and produces copious skin secretion by the action of dilute spray, gargle or irrigation. Saponins are anthelmintic and diuretic.

The addition of Saponin to insecticidal emulsions is advantageous.—Na.

Saponins, various, described.—J. G. Driver and A. G. Trease, P.J. i./27,623.

Sarsæ Radix, Sarsaparilla. *Smilax ornata* (B.P. 1898). (*Liliaceæ.*) From Costa Rica and known as Jamaica Sarsaparilla. U.S. defines *Smilax medica*, known in commerce as Mexican Sarsaparilla; or *S. Officinalis* or an undetermined species of *S.*, known as Honduras Sarsaparilla; or *S. Ornata*, known as Jamaica Sarsaparilla. Lima Sarsaparilla imported from Panama is considered best commercially, that from Honduras being of second quality. *Constituents.*—Saponins and allied bodies—see 17th Edn., p. 691. **Liquid Extract** (B.P. 1898). *Dose.*—2 to 4 drachms. **Liquor Sarsæ Co. Conc.** (B.P. 1898). *Dose.*—2 to 8 drachms. In chronic rheumatism, skin affections and as a "blood purifier." and in syphilis. It was of doubtful value even 150 years ago. *Incompatible* with Alkalis.

Decoctum Zittmanni Fortius. *Dose.*—3 to 6 ounces.

Sarsaparilla (cut small) 200, Water 5,200, maintain at 35° to 40° C. for 24 hours, then add Potash Alum 10, Calomel 8, Precipitated Cinnabar 2. Heat on a water-bath for three hours and add Bruised Anise and Fennel of each 10, Senna leaves (cut small) 50, Liquorice Root (cut small) 20. Continue heating for 15 minutes, strain, and press, passing sufficient water through the marc to make up to 5,000.

Decoctum Zittmanni Mitius. *Dose.*—3 to 6 ounces.

Sarsaparilla 100, Water 5,200, Lemon Peel, Cassia Bark, Cardamoms and Liquorice of each 6. Proceed as in making the stronger decoction.

Both these preparations have been used in syphilis and wasting diseases.

Sassafras Radix (B.P. 1898). *S. officinale*, or *S. variifolium* (*Lauraceæ*). The oil (*Oleum Sassafras*, U.S. X.), containing Safrol, destroys the vitality of pediculi; it should be applied with a stiff brush, but not touch the skin: yet, if so, a little bland oil allays the irritation it causes. **Safrol** $[C_6H_3C_3H_5(OOCH_2)\ 1:3:4] = 162{\cdot}08$. Obtained from sassafras oil, camphor oil, and other volatile oils, is used for scenting cheap soaps, also in manufacture of heliotropin, and as an anodyne liniment in subacute rheumatism. Colourless liquid. Optically inactive. Soluble in an equal volume of strong alcohol and in 30 of 70% alcohol. *Dose.*—20 to 30 minims.

The Sp. Gr. of the oil is usually 1·068 to 1·086. O.R. + 1° to + 3°.

It is used for all lice and nits in pediculosis. In treating ringworm, the hair is cut close round to identify the patches, and the oil applied twice a day by a brush. This is continued for a few weeks if necessary. Non-irritating and pleasant to use, prevents spread of the infection, and destroys the fungus. The oil in capsule form (3 minims) may have the power of reducing body weight.

As an insecticide for dogs and cats Safrol, or Oil of Sassafras, may be extremely toxic in some cases.—P.J. ii./25,576.

Dispensing Note.—To produce an emulsion in water a mixture of Acacia and Tragacanth Mucilage is best. Rub the oil down with the Mucilage of Acacia, *e.g.*, 3 drachms, for a 6 ounce mixture, then add gradually 1 ounce of Tragacanth Mucilage. The acacia divides the oil into particles and the tragacanth suspends them.—C.D.

Saw Palmetto.—A palm growing in America. Possesses sedative, tonic and diuretic properties. Is largely used in urethritis, gonorrhœa, dysmenorrhœa, impotence, cystitis. A liquid extract 1 = 1. *Dose.*—½ to 2 drachms.

Flavoring.—Glyl Lavandulæ (full dose). A solid extract is also prepared. *Dose.*—3 to 5 grains in pill or tablet. Is also frequently combined with Santal in a miscible form.—'Sanmetto.' **Sabal** (was in U.S.) is the partially dried ripe fruit.

Scammoniæ Radix (*B.P.* '14). *Convolvulus Scammonia* (*Convolvulaceæ*), containing about 10% Resin and 15% Sugar. **Scammonium** (B.P. 1898). *Dose.*—5 to 10 grains. Emulsifies with water. The gum resin exuding from the living root on incision. **Scammoniæ Resina** (*B.P.* '14). *Dose.*—3 to 8 grains (0·2 to 0·5 Gm.). Prepared by exhausting the root of Orizaba Jalap with Alcohol 90% and pouring the concentrated tincture into water in a thin stream. Occurs in greenish lumps. Soluble almost entirely in Alcohol and Ether. **Scammonin** is this substance purified. Purgative in obstinate constipation. Produces copious watery evacuation in a few hours. Does not act until reaching the duodenum. *For further details of C. Scammonia and Ipomœa Orizabensis see Vol. II.*

Scilla (*B.P.* '14). *Dose.*—1 to 3 grains. The bulb of *Urginea Scilla* (*Liliaceæ*) (*U. maritima*, U.S. X.), with membranous outer scales removed, cut into slices and dried. Resembles Digitalis in action. It is also expectorant and more diuretic. Preps. are: **Acetum Scillæ**, strength 1 in 4·5 w/v in dilute Acetic Acid.—J. H. Franklin and G. G. Hammond, P.J. ii./22,85. *Dose*, 5 to 15 minims. **Pilula Scillæ Composita** and **Tincture**, 1 in 5 of 60% alcohol.

In U.S. X. are **Acetum** 1 in 10; **Fluidextract**, 1 = 1 Alcoholic, *average dose*, 1½ minims. **Syrup** = Vinegar of Squills 45, Sugar 80, Water to 100; Ⓟ **Syrupus Scillæ Compositus**, *average dose*, 30 minims = Fluidextract of Squill and o Senega each 80, Antimony Potassium Tartrate 2, Syrupus *q.s.* to 1,000. **Tincture**, U.S. 1 in 10.

Squill Preparations U.S. X. are now biologically standardised. *cf.* Digitalis, *Vol. II.*

Poudre de Scille.—Fr. Cx. Max. dose during 24 hours, 15 grains. Fr. Cx. has **Extract** (Alcoholic), with max. doses provided also **Tincture** 1 to 5 Alcohol 60%, max. single dose 25 minims, max. during 24 hours 85 minims approximately.

As a heart tonic it is not satisfactory used by itself. It seems to spend its force on the auricles, leaving the ventricles hardly affected at all. Its glucosides are failures.—G. Sharp, P.J. i./16,347.

Squill as diuretic, *cf.* action of Digitalis, p. 393.

Anasarcin Tablets contain Scillipicridin and Scillitoxin.

For Rats.—Liquid Extract of Red Squill (there are 2 varieties—the red, *Urginea Maritima*, is preferred in France) is efficacious. Add to bread and milk. Comparatively harmless to larger animals, advocated by Min. of Agriculture.—P.J., ii./27,524. The rat-poisoning substances appear to be present in significant amounts in the Red Squills only.—F. R. Winton, Jl. Ph. and Exp. Ther., June '27,137. Barium Carbonate is deadly. Virus not advised.—L, ii./22,1081. See also F. W. Smith, P.J. i./21,139.

Scopola Carniolica (*Scopolina atropoides*) and **S. Japonica** contain Solanaceous alkaloids. See Edn. XVIII. p. 857.

Scutellaria. *Dose*, 5 to 15 grains. Dried herb of *Scutellaria lateriflora*, Linné (N.O. *Labiatæ*). Used in the form of dry, greenish-brown powdered extract (scutellarin). *Dose*, 1 to 5 grains. For epilepsy, insomnia, and hiccough. **Liquid Extract** 1 = 1. *Dose*, 5 to 15 minims.

In epilepsy a simple infusion or extract appears to stimulate the kidneys and increases output of urea and uric acid. In chorea effects even more marked. —W. Bramwell, B.M.J. ii./15,880.

Sempervivum tectorum, Common Houseleek. The bruised recent leaves are employed as cooling applications to burns and other external inflammations. Succus (preserved with 20% Alcohol) is said to cure warts.

Senecio.—Ragwort. *Senecio Jacobœa* and *S. aureus* (*Compositæ*) are emmenagogues, and have been employed in amenorrhœa and dysmenorrhœa especially when depending on chill. Liquid Extract, 1=1 of herb. *Dose,* 20 to 60 minims. Tincture, 1 in 10 of proof spirit. *Dose.*—1 to 2 drachms. *Senecin* is a dry extractive. Two alkaloids, P1 Senecionine and P1 Senecine are contained. Excellent in gastralgia and dyspepsia.

Tablets Senecio Compound. A proprietary preparation.

Senecio latifolius.—Closely related to the common groundsel (*S. Vulgaris*). This and various other species induce fatal poisoning in cattle and horses —hepatic cirrhosis—in South Africa, Canada, and New Zealand.

Two new alkaloids isolated.—P1 Senecifoline M.pt. 194° C. and P1 Senecifolidine M.pt. 212°. The former has been reported on by Cushny as being poisonous to animals. The plant is thought to be responsible for 'Molteno disease' in cattle in S. Africa.

Senega (*B.P.* '14), U.S. X. Dried root of *Polygala senega* (*Polygalaceæ*). An expectorant, contains Senegin. **Infusion** 1 in 20, Concentrated Solution 1 in 2 (B.P. '98). **Fluidextract,** U.S., 1 = 1. *Dose.*—15 minims. The alkali contained forms soluble compounds with the pectin principles in the root thus preventing gelatinisation (Caspari). **Syrup.** U.S. *Dose*—1 drachm.—Fluidextract 20, Ammonia Water 1, Simple Syrup to 100. The concentrated infusion of commerce is apt to deposit, owing to action of enzymes; less likely to if made with a little alkali. **Polygalæ Radix, P. Belg.,** is the same. Fluidextract P. Belg. yields 25% solid matter. **Tincture** (*B.P.* '14) 1 in 5 Alcohol 60%.

Ⓟ *Infusum Polygalæ Compositum.* *Dose.*—½ to 1 ounce. Senega 10, boiling water 100, potassium iodide 5, paregoric 20, lobelia tincture 10. In use on the Continent.

Tisane de Polygala (Root)—(Fr. Cx.), 1 in 100 boiling water; infuse ½ hour.

Senna (*B.P.* '14). The dried leaflets of either *Cassia acutifolia* (Alexandrian) or *C. angustifolia* (East Indian or Tinnevelly) (*Leguminosæ*). Activity due to Cathartic Acid. Constituents are Emodin (Tri-oxy-methyl-anthraquinone), Chrysophanic Acid, etc. The **legumes or fruit, Sennæ Fructus,** of both these varieties are in use. These are stronger than the leaves.—Tschirch. Experience has shown that the legumes are more active if *green.*—W. H. M. With aid of radio-graphic pictures it has been shown that Senna (infusion) acts only on the colon (peristalsis of). It has little or no action on peristalsis of the small intestine and stomach.

Confectio Sennæ (*B.P.* '14).—*Syn.* LENITIVE ELECTUARY. *Dose.*—60 to 120 grains. Contains Senna 10% with Coriander, Figs, Tamarind, Cassia Pulp, Prunes, Extract of Liquorice, Sugar and Coriander. The use of 0.5 % Coriander Oil instead of fruit would prevent grittiness in taste. **Confectio Sennæ et Piperis L.H.** Equal parts of Confection of Senna and Confection of Pepper. **Elixir Sennæ,** B.P.C. 1901. *Syn.* LIQUOR SENNÆ DULCIS. *Dose.*—1 to 3 drachms. In this preparation the Cathartic Acid, not being subjected to long exposure to heat, is preserved from oxidation; **Cathartic Acid** is sometimes prescribed in doses of 4 to 8 grains in pills but is unstable. **Extractum Sennæ (Leguminum) Liquidum,** B.P.C. *Dose.*—1 to 2 drachms. Strength 1=1. R. Stockman concluded by comparing effects of preparations from the whole fruit, from the *pericarp freed from seeds* and from the uncrushed seeds that the second is best.—B.M.J. ii./15,128. **Elixir Sennæ Leguminum,** *Martindale.* *Dose.*—1 to 3 drachms, is prepared, as Elixir Sennæ, B.P.C. 1901, using legumes instead of leaves. **Mistura Sennæ Composita.**—*Syn.* BLACK DRAUGHT (*B.P.* '14). *Dose.*—1 to 2 ounces. **Syrupus Sennæ** (*B.P.* '14). *Dose.*—½ to 2 drachms. 1 drachm = ½ drachm of leaves approx. **Tinctura Sennæ Composita** (*B.P.* '14.) *Dose.*—4½ to 1 drachm repeated, 2 to 4 drachms for a single dose. Senna 1 in 5, with carminative. **Tinctura Sennæ Leguminum.** The same strength as above using legumes in place of leaves.

Serpentariæ Rhizoma (*B.P.* '14), U.S. X. *Average dose.*—**15 grains** (1·0 Gm.). Dried rhizome and roots of *Aristolochia Serpentaria* (*Virginia Serpentary*) or of *A. reticulata* (Texas *Serpentary*) (*Aristolochiaceæ*). Bitter tonic. Infusion (B.P. '98), 1 in 20, Concentrated Solution 1 in 2 (B.P. '98), Tincture (*B.P.* '14) 1 in 5, 60% Alcohol. **Liquid Extract,** 1=1 Hydro-alcoholic. *Dose.*—5 to

15 minims. **Tincture,** U.S. VIII., 1 in 5 of Alcohol and Water in proportion of 65 and 35.

Shellac.—A resinous substance formed by a scale insect, *Tachardia Lacca* (fam. *Coccidæ*, ord. *Hemiptera*), which lives on a large number of trees, *e.g.*, *Butea frondosa*, *Ficus religiosa*, *Schleichera trijuga*, *Shorearobusta* (Wild Lac). The plants specially cultivated for Lac are *Acacia arabica* and *Cajanus indicus*. Treatise on chemistry of shellac.—P.J. ii./05,653.

Simaruba officinalis (*Simarubaceæ*).—*Syn.* MOUNTAIN DAMSON. *Dose.*—15 to 30 grains. Infusion 15 grains to 1 ounce in boiling water (infuse 15 minutes). *Dose.*—1 ounce. Has bitter taste, is astringent, and useful in dysentery. Contains a colourless crystalline bitter glucoside. **Decoctum Simarubæ et Punicæ Granati.**—Add Simaruba Bark, Pomegranate fruit rind and Gum Arabic of each 15 Gm. to a litre of water and boil down to ½ litre. *Dose.*—30 Cc. three or four times daily. Cures dysentery rapidly. (Egypt.)—Ph. Notes. The quantities and the ingredients have been varied from time to time. The Ministry of Health replaced Cinnamon for the Acacia.—C.D. 1920,1320. See also Mar. 26, 1921,442.

For *E. Histolytica* carriers.—*Dose* of ½ to 2 handfuls of pieces of the bark cut into ½ inch lengths given in 1 pint drinks gave some success.—S. Shepheard and D. G. Lillie, L. i./18,501.

Solanum Carolinense.—Horse-nettle. A native of Southern U.S. A liquid extract 1 = 1 is employed in epilepsy. *Dose*, 15 to 60 minims.—H.

Solanum Dulcamara (*Caules Dulcamaræ*, P. Austr.) (*Solanaceæ*).—Woody Nightshade. Bittersweet. The dried herb is employed. Sedative analgesic. Description of, also of *S. Nigrum*.—E. M. Holmes, P.J. ii./15,524.

Solanum Nigrum.—Black or garden Night-shade. The leaves are said to be eaten boiled in the Isles of France and Bourbon and Hawaii Islands.

The **Wonderberry** is stated to be from a luxuriant form or hybrid of Solanum Nigrum and to be edible (cooked). Containing 0·3% of *Solanine*. Tomatoes also contain this alkaloid. It is taken as a diuretic for skin diseases and the juice for the enlargement of the liver.

Solanum Sodomæum.—The fruit of this plant is the apple of Sodom—when ripe is a pale yellow berry averaging 1 inch in diameter. Employed for destroying parasites in S.A., also for itch, ringworm, etc.—Juice of the fruit is extremely acid and bitter—it also contains Solanine.—Oliver.

Solanum Tuberosum. Extractum Solani Liquidum.—The concentrated juice of the potato preserved with glycerin has been used in synovitis, gout, lumbago, and rheumatism—as also Liniment, plaster and Ampoules.—Heaton C. Howard, L. i./14,1035; C.D. i./14,600.

Mosaic disease of tobacco leaf and other plants, leaf roll of the potato, and Botrytis of grapes compared with animal diseases. Leaf roll and mosaic are carried by aphides.—V. H. Blackman, B.M.J. ii./22,718.

Sorbus Aucuparia.—The Mountain Ash. A liquid extract is prepared, 1 = 1. *Dose.*—10 to 30 minims. A useful mild aperient: also has diuretic and emetic properties. Berries have sialogogue effect. They act best when not too ripe.—W. Johnson Smyth, B.M.J. i./28,243.

Sorghum. Chinese Sugar Cane. *Andropogon arundinaceus* (*Gramineæ*): Indigenous in China and India and cultivated in U.S. Proprietaries such as 'Lithiated Sorghum Comp.,' are popular in America in bladder affections.

Soya Bean.—*Glycine Hispida* (*Leguminosæ*). Cultivated in China and Japan for human use and latterly in America and Europe, chiefly for forage. A method of use in the East is to boil until soft and then ferment in a warm cellar—the resulting 'cheese' being known as 'Natto.'

It contains 38·5% Protein (on dry) and 20% fat. For this reason, no doubt, the Chinese and other rice-eating people require so little meat. It contains practically no Starch—the latter fact is said to be due to presence of a diastase in the bean capable of converting Starch formed, two-thirds into Sugar, one-third into Dextrin. Has been used as an addition to ordinary diabetic dietary,—the beans may easily replace the Gluten of bread,—causes reduction in percentage of sugar.—L. ii./10,1844. **Soy Flour** is even more serviceable, containing almost ⅓ more Protein than the bean, this being due to the removal of the fibrous hulls, which contain but little Protein.—B.M.J.E. i./11,80. It must be carefully examined for the toxic *Java Bean*.—F. W. Crossley Holland, P.J. ii./12,154. For further data see Edn. XVIII. p. 860.

'**Synthetic Milk**' made from it is indigestible and its adoption was found impossible in Germany even during the war. An improved Soy Meal is better and is almond-like in taste. In protein value, the haricot bean is the only serious competitor. It should be tried on a large scale amongst the poorer classes.—T. R. Parsons, L. i./27,267; *ibid.*, 241.

Soya Oil has Iodine value 121 to 123. P. Svec X. has 115 to 137. For further characters see **P.J.** ii./11,407. *cf.* p. 619.

Spigelia. *Sp. Marilandica* (*Loganiaceæ*), Indian Pink-root. *Average dose.*—60 grains. **Fluidextract**, U.S. IX. 1 = 1 diluted Alcohol. *Average dose* 1 drachm. Is employed for round and tapeworm, but is very potent.

Stannum, Sn = 118·7 **Tin.** The metal in finely powdered—preferably precipitated form. Given internally pure tin powder is probably not absorbed.

The metal in filings or powder was formerly used as a tæniacide, the destruction of the worm being due to the mechanical action of the foreign substance. From 4 to 15 Gm. were given suspended in syrups or made into an electuary and followed in from 3 to 6 hours by a brisk cathartic. Some of the salts (chiefly Chloride) are credited with vermicidal properties. In dose of 1/16 to ½ grain the chloride has been used as an antispasmodic in chorea, epilepsy and other convulsive diseases.

Stanni Oxidum (Stannic). $SnO_2 = 150·7$. Greyish white in colour. Used chiefly technically and as cosmetic diluted, *e.g.* as nail polish. Distinguish from Stannous Oxide SnO which is dark grey—nearly black.

'Putty powder' is usually a mixture of tin and lead oxides or a stannate of lead, used for polishing glass.

Jungman's Tooth Powder. Tin (Stannic) Oxide 15, precipitated chalk 60, soap 4, sugar 5. Flavour with mixed oils as for Blair's Tooth Powder; mix these first with the sugar.—**H. Kraemer, J. Am. Ph. As.,** Jan. 1922, p. 43; **P.J.** i./22,263.

✱**Stannoxyl** (T.M. 379084) **Tablets.** Contain metal tin and oxide of tin. *Dose.*—Four to eight, children two to four per diem at any hour in the day either in water or eaten dry. 2 Cc. ampoules for intramuscular injection, also Liquid for internal use are made.

For boils, carbuncles, furunculosis, acne and styes.

It has been found that tin workers never suffer from boils. Powdered tin is a popular remedy for this complaint. In France Gregorie & Frouin tried doses of from 0·5 to 1 Gm. of powdered tin or oxide of tin in 50 cases.

Staphisagriæ Semina. *B.P.* '14 *Average dose* (U.S. IX.).—1 grain.

The seeds of *Delphinium Staphisagria*, **Larkspur** (*Ranunculaceæ*) contain about 30% of oil and the white crystalline alkaloid. $\boxed{\text{P1}}$ **Delphina.** *Syn.*—**Delphinine.** *Dose.*—$\frac{1}{64}$ grain increased to ¼ grain. Soluble in water, alcohol and ether. This acts chiefly on the nervous system, first upon the bulb, next on the sympathetic. Said to be preferable to Aconitine, being less toxic. It acts on the heart, accelerating the cardiac movements, until finally arrest occurs in diastole.—L. ii./18,96. Given internally in toothache, neuralgia, earache, rheumatism, dropsy, and spasmodic asthma. Locally an alcoholic solution or ointment, containing 2 to 8%, causes tingling and transient redness like veratrine. Ⓟ One part of the Oil expressed from the seeds to 6 or 12 of perfumed olive or almond oil effectually kills pediculi of all kinds. Remove nits with a mixture of vinegar and proof spirit. Ⓟ **Unguentum** (*B.P.* '14). For scabies and to kill lice. Ⓟ **Fluidextract U.S. IX.** 1 = 1 Hydro-alcoholic. *Average dose.*—1 minim.

Lotio Staphisagriæ. *Syn.* **Lotio pro Capite.** St. Bart's H.

Boil Stavesacre Seeds 1 drachm with Dilute Acetic Acid 24 minims and water 1 ounce 1 hour, cool, strain and add Quinine Sulphate 1 grain, Glycerin 24 minims, Oil of Sassafras 1 minim and make up to 1 ounce with water.

Stillingia Sylvatica U.S. IX. (*Euphorbiaceæ*), Queen's Root. *Dose.*—Average 30 grains. Contains Volatile Oil and Alkaloid (?). Large doses emetic, cathartic; small doses alterative. Is employed in scrofula, syphilis, jaundice, and for piles. **Fluidextract U.S. IX.** 1 = 1. *Dose.*—30 minims. **Liquor Stillingiæ Compositus** is McDade's Succus Alterans for syphilis. *Dose.*—1 drachm.

Styrax Preparatus (*B.P.* '14). U.S. Thick brownish liquid compound obtained from *Liquidambar orientalis* (*Hamamelidaceæ*). Contains Cinnamyl Cinnamate (Styracin) and other Cinnamic Acid Compounds, together with a large proportion of Storesin, $C_{36}H_{55}(OH)_3 = 538·464$. It should contain 20% Cinnamic Acid. Ointments of 20% are used in parasitic skin affections.

Phenyl-propyl Alcohol. *Syn.* Hydrocinnamyl Alcohol occurs in Storax as a Cinnamic Acid ester. It is a thick colourless oil (Sp. Gr. 1·007) with odour resembling Cinnamic Alcohol and hyacinths. It is used in hyacinth, narcissus, jonquil, and like perfumes.—P.R., July 5th, 1914, p. 189.

Certain of the constituents, it is said, are extracted from storax before it comes on the market; *see Edn. XVIII, p.* 861.

Constants for identification and detection of adulterants.—Y.B.P. '27,158.

Phenyl propyl acetate, allied to Styracin, is a synthetic substance used in manufacture of Synthetic perfumes and fruit essences.

Succinum.—Amber obtained from a fossil resin found in Germany. Oleum Succini. *Dose.*—1 to 5 minims. Useful in persistent hiccough, asthma, whooping cough and hysteria. Diluted with Olive Oil is rubbed upon rheumatic parts and upon the chest for bronchitis and pertussis.

Genuine Oleum Succini Rectificatum has Sp. Gr. 0·950 approximately. Commercial **Oil of Amber** is almost entirely derived from the crude resin spirit obtained from colophony resin. It has Sp. Gr. 0·850 to 870. Like the genuine oil it consists chiefly of Terpines.

B.P.C. has Amber Oil 1, Clove Oil 1, Olive Oil 2, as **Linimentum Succini Compositum.**

Artificial Amber. The most important constituents stated to be Phenol, Formaldehyde and Ammonia boiled together in a porcelain crucible. Glacial Acetic Acid, Sodium Sulphite, Soda and Hydrochloric Acid are added and the mixture boiled until resinous mass formed.—B.M.J.E. ii./21,45.

Sumbul Radix (B.P., 1898). *Syn.* Musk-root. Transverse slices of the root of *Ferula Sumbul* (*Umbelliferæ*). Nervine sedative and antihysteric. Contains aromatic volatile oil, and resin. **Tincture** 1 in 10. *Dose.*—30 to 60 minims. **Fluidextract,** U.S. IX., 1=1 hydro-alcoholic. *Average dose,* 30 minims.

Symphytum officinale (*N.O. Boraginaceæ*).—The Common Comfrey plant with root boiled as a poultice has been used for cancerous tumours, also for hæmoptysis and kidney disease with blood in the urine, as a decoction or syrup. Root pulped was used to stiffen bandages for fractures.

According to investigation of C. J. Macalister and colleagues this plant, which has been used from Saxon days as a 'vulnerary herbal,' contains **Allantoin.** Titherley and Coppin found 0·6 to 0·8 % in the air dried material. See also A. Vogl, Y.B.P., 1919,165.

A strong (mucilaginous) **Infusion** of the root. *Syn.* **Mucilago Symphyti.** *Dose.*—1 to 2 ounces. Comfrey Root in coarse powder 1, Boiling Water 20—infuse 20 minutes, strain, cool, and add Chloroform 1 in 500. Applied to an ulcer measuring 3 by 4 inches involving the skin and deeper structures over the upper thorax, for about a week, cleaned it and produced a distinct growth of epithelium from the margins.

Concentrated Infusion.—*Dose.*—2 to 4 drachms. Suitable for dilution 1 with 3 of water. **Liquid Extract.** *Dose.*—2 to 4 drachms 1 in 4 by extracting the drug in coarse powder with water, and preserving with 20% of 90% alcohol. **Solid Extract.** *Dose.*—5 to 10 grains is prepared by extracting the drug with water at about 65° C. and evaporating and powdering. **Elixir Symphyti.** *Dose.*—½ to 2 drachms diluted is also made.

Liquid Extract applied on lint to saturation has been found useful to cure old ulcers. The nightly application of the Infusion was found to be the only remedy for pruritus ani in a case where sleep was prevented for weeks together. Internal use of the Infusion satisfactory in gastralgia,—eases pain of gastric ulcer,—indeed the internal use is more wonderful than its effect in external application,—promotes the growth of new mucous tissue.—W. Bramwell, B M.J. i./12,12.

It is an old remedy for coughs and weak chests.—B.M.J. i./15,748. This plant and *S. tuberosum* have both the same properties, resembling the COMMON BORAGE, BORAGO OFFICINALIS (*cf.* Tisanes) in many respects, both yielding Allantoin-containing infusions.—B.M.J. i./12,336 (Historical Notes—Prosper H. Marsden. *Ibid.*, pp. 344, 393).

Allantoin.—$C_4H_6N_4O_3$ = 158·08. *Dose* of Saturated Solution (0·3 to 0·4%) ½ to 1 ounce three or four times daily. *Soluble* in water 1 in 260, in alcohol 90% 1 in 2,360, in alcohol 80% 1 in 1,700, in absolute alcohol 1 in 5,000 (all by experiment). This substance is obtainable in brilliant crystals with indefinite melting point, *i.e.*, decomposes. *Manufacture.*—May be prepared artificially by oxidation of Uric Acid in Alkaline Solution in the cold.

Uses.—Allantoin is a cell proliferant and is used locally as the Saturated Solution. For chronic varicose ulcers, boils, wounds, burns, etc., and after skin grafting. The dressing is applied on lint or gauze and covered with gutta percha tissue, renewed as required. Some use alcoholic solutions (0·5%). Allantoin Ointment 0·3% in soft white paraffin suggested for bed sores.—W.H.M.

It is interesting that Allantoin is present in animals and in plants, *e.g.*, in the fetal allantoic fluid (hence the name), also in the urine of pregnant women, and in small amounts in normal urine. It may be derived in the latter from vegetable foods—it appears to come from these. It may pass practically unchanged through the human being. It is present in wheat germ, bread, French beans and green peas. Although the Allantoin in the human embryo may be a fœtal waste product, in the economics of nature it may have a function to perform regarding cell multiplication, especially as it is not at once eliminated from the maternal circulation,—it occurs in milk,—the food of the rapidly growing young organism.—P.J. ii./13,117.

Allantoin is not poisonous. It favours rather than inhibits the growth of organisms—demonstrated by experiments on simple forms of life from sea water. Further *B. Coli*, *Staphylococci*, *Streptococci* and *Tubercle Bacilli* are not affected by presence of 0·2% in the culture medium. In Comfrey rhizome it is abundant in the spring but almost absent in the summer (June). Allantoin (15 minims of 0·4% solution) injected into hyacinth bulbs in process of growth causes them to flower more rapidly.

In *malignant* cases it should not be used. It has in some way to do with the activities of **Nucleic Acid**, which contains four Metaphosphoric Acid radicles and Purine and Pyramidine groups. Both of these yield Uric Acid in their metabolism and Uric Acid on oxidation yields Allantoin. Cellular resistance may depend on efficient building up of Nucleic Acid.

Metaphosphoric Acid in conjunction with Allantoin has been tried in tubercular sinuses and skin affections internally and hypodermically with promising result.—C. J. Macalister, B.M.J. ii./12,702.

Tamarindus Indica (*Leguminosæ*). *Dose.*—1 to 8 drachms. The preserved fruit contains Tartaric Acid and Potassium Acid Tartrate in considerable quantity, and added sugar about 30% It is also imported pressed into a solid mass as pulp.

Pastilli Tamarindorum Compositi. P. Aus. Add. VIII. **'Hindu Dates,'**—Tamarind Pulp 10, Senna in fine powder 3, Sugar 5, Wheat Starch 1. Mix on water bath. Divide into Pastilles weighing about 40 grains each and cover with chocolate. Useful laxatives for children and invalids.

Tanacetum, Tansy.—Leaves and tops of *Tanacetum vulgare.* An aromatic bitter used as a vermifuge, but may cause dangerous irritation. **Liquid Extract,** 1=1. *Dose.*—15 to 30 minims.

Taraxacum officinale (*Compositæ*) (*B.P.* '14). *Dose,* 30 to 120 grains. Its preparations are: **Extractum** from fresh root. *Dose.*—5 to 15 grains. **Liquid extract** (B.P. '98), 1=1. *Dose.*—½ to 2 dr. *Flavoring.*—Syl Limonis, Syl Cinnamoni, Syrupus Zingiberis. **Succus** (*B.P.* '14), 3 of expressed juice with 1 of alcohol 90%. *Dose.*—1 to 2 dr. **Taraxacum Cocoa.** **Laxative suitable for children who are bilious.** ***Dose.*—One tablespoonful to be taken in the morning.**

Malignant disease treated by the Liquid extract.—B.M.J. i./13,1256.

Choline is contained in the root.—F. B. Power, P.J. ii./12,694.

Facts and fancies about Dandelion, and other *Compositæ* from the botanical aspect.—J. Small, P.J. ii./16,157.

Taxus Baccata.—The Yew. P1 Taxine, an alkaloid, is a constituent. *Dose.*—$\frac{1}{100}$ to $\frac{1}{60}$ grain. Is said to have an action on circulation.—Proc. Chem Soc., Vol. 18, No. 253.

The berries are poisonous. Description.—E. M. Holmes, P.J. ii./15,638,641. Poison probably obtained from Yewberries was used on arrow heads by the Greeks of old.—Sir C. Ballance, L. i /20,5.

Terebinthina Chia, P.L.—*Dose.*—5 to 10 grains. Oleoresin from trunk of *Pistacia Terebinthus*; was used for cancer of the female generative organs.

Teucrium Scordium (*Labiatæ*).—Water Germander. *Dose.*—10 to 20 grains. Contains a volatile oil and a bitter principle. Given for hæmorrhoids and pruritus ani. Diaphoretic; tonic for scrofula, gout, dropsy, flatulence. Liquid Extract. *Dose.*—½ to 1 drachm. Ⓟ **Electuaire Diascordium, 'Diascordium,'** Fr. Cx. Water-Germander Herb 50, Red Rose petals 20, Bistort Root 10, Gentian 10, Tormentilla 10, Barberry Berries 10, Ginger 5, Long Pepper 5, Canella 20, Siam Benzoin 10, Galbanum 10, Gum Arabic 10, Carbonate of Iron 20, Opium Extract 5, Mellitum Rosæ—Mellité de Rose Rouge 650, Malaga Wine 100—by weight throughout. 15 grains of this Electuary contains 0·006 Gm. (about $\frac{1}{10}$ grain) of Opium Extract.

Thallium. Tl=204. This element, resembling lead on the one hand and Potassium on the other, was discovered by Crookes by spectral analysis in residues of sulphuric acid manufacture.

Thallium Acetate. $TlC_2H_3O_2 = 263{\cdot}414$. *Dose.*—1½ to 3 grains was tried in syphilis, but is not equal to mercurials; if given an hour before the commencement of a sweat, was found of value in the night sweats of phthisis. Loss of hair and arrest of perspiration accompany its use.

Epilation in Ringworm—it has been much advocated for this, the direction being to administer it only to children who have not reached the age of puberty.

Dose.—8 mgr. per kilo dissolved in water 2 ounces, *per os*, has been suggested. A child of 3 stone would thus receive 180 mgr. (3 grains approx.). Merck's Index (1907) gives 1½ to 3 grains as epilation dose. The hair begins to come out on the 7th to 9th day. Treatment should begin from the first day by means of a fungicide ointment; *v. infra.* The hair begins to grow again in about 4 weeks. Thallium Acetate **Tablets** are made 0·1, 0·01 and 0·001 Gm.

63 children, aged from 2 to 16, treated with dose of 8 mgr. per kilo (7 mgr. when exceeding 25 kilos) in the morning on an empty stomach. Hair was pulled out easily after 6 days and was completely removed after 14-15 days, except at edge of the forehead. Complete removal of lanugo and stumps of hair by application of Colophonium and wax cap. Following this, rapid cure was achieved by alternate daily application of Tincture of Iodine and Precipitate Ointment.—H. Kleinmann, Ars Medici (Vienna), Vol. V., No. 3, Mar. '27,127.

In 40 cases, treatment failed in only 2. No relapses and drug well tolerated. 4 patients developed abdominal pain and diarrhœa, and 7 pain in the knees, symptoms lasting from 1 to 3 days. Folliculitis of scalp often developed, but subsided under treatment with Sulphur or Mercury ointment.—B.M.J.E. ii./25,96.

Rapid and profuse epilation. Contraindicated in albuminuria. Second dose must not be given for 2 or 3 months, as it is ***cumulative*** and acute poisoning might develop.—B.M.J. i./27,329. See also F. R. Curtis, L. i./27,1290.

Advantages over X-rays are the absence of danger from burns, permanent alopecia, or incomplete epilation. After depilation, paint with Iodine 4% thrice daily for 4 days. At least three weeks later an ointment of equal parts of Oil of Cade, Vaseline and Lanolin is rubbed in daily.—B.M.J.E. ii./27,81.

Infected stumps extracted by use for 4 days of a Strong Solution of Ferric Chloride. Patient to be kept in bed during treatment.—G. B. Dowling and R. Kelman, L. i./27,389.

Toxic Symptoms: headache, loss of appetite and pain in joints—noticed second and third weeks.—Dowling and Kelman, *ibid.*

Thallium is a poison with physiological effects resembling those of Lead, and its use requires great care. Should be thoroughly tested.—Leader, L. i./27,450.

Further on toxic effects, see G. B. Dowling, B.M.J. ii/27,261; A. Seaston and C. R. Wilson, *ibid.* 263: and J. H. T. Davis, B.M.J. ii./27,79.

An alarming case of Thallium poisoning in a child aged 11 years, after receiving 8·5 mgr. per kilo of Thallium Acetate. Symptoms continued for more than a month.—J. H. T. Davis and M. C. Andrews, B.M.J. ii./27,1139.

Doses of more than 0·014 Gm. per kilo were almost invariably lethal to rabbits and guinea-pigs, the main lesion being an acute tubular nephritis.—L. ii./27,156.

Thallium, administered chiefly in the form of its Acetate, exerts a definite action on the endocrin-vegetative system.—A. Buschke and B. Peiser, Klin. Woch., Dec. 17, '25.

A workman drank a small quantity—less than 1 Gm. in solution in a Vichy bottle. Caused vomiting, acute sense of internal chill, cyanosis, lowered temperature, pain in the kidneys and reduction in urine voided. Abundant drinks were ordered, and baths. Symptoms disappeared in a few days. Loss of hair and arrest of perspiration were *not* seen.—L. i.'11,1461.

Thebaine Hydrochloride Ph. Ned. V. $C_{19}H_{21}NO_3.HCl.\frac{1}{2}H_2O = 356{\cdot}649$.
Dose.—½ to 1 grain *per os* increased with care, Hypodermically $\frac{1}{10}$ grain.

The salt of an alkaloid of Opium, soluble about 1 in 15 of water. Has been used in neuralgic affections.

Thuja Occidentalis.—Arbor Vitæ. A Tincture is prepared, of the dried young tops in 10 of 70% alcohol. *Dose.*—2 to 5 minims (0·12 to 0·3 Cc). Thuja has an irritating action on the skin, and has been employed to remove warts and fungoid granulations from ulcers; internally for amenorrhœa, pulmonary catarrh, and worms. ✱**Ecthol** (T.M. 224,575). *Dose.*—1 drachm well diluted. Is said to contain *Thuja occidentalis* and *Echinacea angustifolia.* Employed in all forms of septic conditions, *e.g.*, typhoid, erysipelas, diphtheria, acne, etc., also locally for any kind of pustular formation; as wound dressing, diluted with 2 to 10 times volume of boiled water.

Thymus Vulgaris (*Labiatæ*). Thyme. **Extractum Thymi Liquidum, P. Helv.** *Dose.*—5 to 30 minims. Moisten Thyme 100 with a mixture of Glycerin 10, Alcohol 20 and Water 20. Percolate with a mixture of Alcohol 1 and Water 3, and reserve the first 85. Percolate further, recover the alcohol, and evaporate second percolate to soft extract and dissolve in reserve so as to produce 100. *Flavoring.*—Syl or Glyl Pini, or Lavandulæ, Syrupus Aurantii. **Pertussin,** a proprietary article for whooping cough, contains this drug. *Dose.*—1 to 4 drachms repeated. **Syrupus Thymi** (Ph. Notes). Liquid Extract of Thyme, 1 Syrup 7 has similar properties and dose. J. Pollard finds this preparation with a small dose of Diamorphine a virtual specific for hacking cough. The following are two useful mild sedative preparations for cough: Ⓟ**Linctus Thymi et Diaphorm.** *Dose.*—1 drachm as required. Diamorphine $\frac{1}{48}$ grain, Syrup of Thyme to 1 drachm. Ⓟ**Elixir Thymi de Diaphorm.** *Dose.*—1 drachm as required. Diamorphine $\frac{1}{48}$ grain Compound Tincture of Lavender 15 minims, Syrup of Thyme to 1 drachm.

Oleum Thymi, *Dose.*—3 minims. Distilled from the fresh herb—*cf.* Origanum Majorana. It contains 25% Phenols (Thymol and Carvacrol).

"Red" Thyme Oil on rectifying is converted into White Thyme Oil. To prevent this turning red again it is frequently distilled with a large amount of Turpentine, or indeed the white variety is simply a dilution with Turpentine. This adulteration can be detected by the fact that the Phenol content, Solubility in Alcohol and Sp. Gr. are all lowered.—*cf* P.J. ii./10,760.

Oil of Red Thyme is obtained from the fresh herb, Thymus Vulgaris and other vars. in Southern France. Spanish Thyme Oil is probably derived from a species of Origanum, but has not been definitely ascertained. Characters: Sp. Gr. 0·905 to 0·930, Phenols 20 to 45%; constituents: Thymol and Carvacrol, *l*-pinene, Borneol and Linalol.—C. T. Bennett.

Tragopogon Pratense (*Compositæ*). 'Goat's Beard.'—Poisoning by seeds of, called 'Gipsy Nuts,' has occurred. Give Emetic: Strychnine *hypod.*

Ulmus fulva (*Ulmaceæ*).—The SLIPPERY ELM, U.S. X. (*Ulmus campestris* is common in Europe). The inner bark of fibrous texture has a highly mucilaginous taste; in powder is much used as a demulcent. It should be free from starch. Ten grains shaken with an ounce of water should form a thick jelly-like fawn coloured mass. *Decoction.*—1 in 8. *Dose.*—2 to 4 ounces. A mucilage 1 in $16\frac{2}{3}$ was Official in U.S. VIII. **Glycogelatin Pastils** are prepared containing 2 grains.

Unoline. A salt prepared from charcoal with addition of fruit juices and an antiseptic, forms a useful acid tooth paste termed Willowcine.—W. J. Henson, B.M.J. i./21,408.

Urginea.—Indian Squill. *U. indica* and *Scilla indica* are *B.P.* '14 and preparations Acetum, Pilula Ipecacuanhæ cum Urginea, Pilula Composita, Oxymel Urgineæ, Syrupus and Tinctura correspond with Squill preparations for use in the Tropics.

Vanadium ($V = 50{\cdot}96$).—Meta-Vanadic Acid, $HVO_3 = 99{\cdot}968$ and Sodium Meta-Vandate, $NaVO_3 = 121{\cdot}957$. Of these the last has been used in chlorosis, phthisis, and rheumatism as tonics and antiseptic.—*Dose.* 1/32 grain or 1/5 the quantity injected hypodermically. Soluble in water, 2 in 1.; decomposes in the presence of organic matter. **Vanadine.**—A liquid preparation of French manufacture, said to contain a vanadium salt and sodium chloride. Is used for gastralgia and dyspepsia.

Vanillin. U.S. X. Methylprotocatechuic Aldehyde. $C_6H_3OH.OCH_3.COH.\ 4:3:1 = 150{\cdot}064$. Occurs in white acicular crystals, having a strong odour if obtained from *Vanilla planifolia* (*Orchidaceæ*) (the cured full-grown but immature fruit), but is mostly made synthetically from guaiacol or from eugenol or from coniferine, a glucoside obtained from coniferous woods.

Soluble in alcohol, ether, and oils, sparingly so in water. Use suggested in atonic dyspepsia as an excito-motor stimulant. For employment as test, *vide Vol. II.* **Solutio Vanillin.**—Vanillin 80 grains, Alcohol 90% to 1 ounce. For ordinary purposes ½ drachm will flavour a pint of medicine. **Essence of Vanilla** 1 in 8 by macerating Vanilla Beans 1 finely ground with Sand 1, in a mixture of Water 2, and Alcohol 90% 6. From this are prepared **Glyl** and **Syl Vanillæ** *q.v.*

Marked skin irritation caused by local use of Vanilla Essence in a hair wash. Relieved by Mercuric Iodide in Spirit.—Leggett, B.M.J. i./14,1351.

Elixir Vanillini Compositum : N.F. *Dose.*—½ to 1 drachm, Mix Compound Spirit of Vanillin 20, with Alcohol 80, add Glycerin 25, then Syrup 300 and Water 550 in several portions with shaking. Then Tincture of Caramel 20 (Caramel 1, Alcohol 2·5, Water to 10). Finally Water to 1000. Filter with Kieselguhr.

Spiritus Vanillini Compositus : N.F. V. *Dose.*—½ to 1 drachm. Vanillin 40, Oil of Orange 10, Oil of Cardamom 2, Oil of Cinnamon 1, are dissolved in a sufficiency of Alcohol to make 200. Store in tightly stoppered amber bottles away from light.

P1 Veratrina (B.P. 1898). Ph. Ned. V. *Dose.*—$\frac{1}{64}$ to $\frac{1}{16}$ grain. A mixture of alkaloids, chiefly amorphous veratrine and crystalline Cevadine, from Cevadilla seeds—*Schœnocaulon* (*Asagræa*) *officinale* (*Liliaceæ*)—in greyish white masses, taste bitter and acrid. Nearly insoluble in water; *soluble* 1 in 3 of 90% alcohol; 1 in 6 of ether. It is used as an antipyretic *with caution,* and circulatory sedative in fevers and acute inflammations—resembles Aconitine in its general effects. Large doses cause vomiting and purging; sometimes for neuralgia, spasm, rheumatism and gout. Externally in the form of ointment for neuralgic pains and swellings.

Caution. Its sternutatory properties are most marked.

Ⓟ **Oleatum Veratrinæ.** Veratrine 2, Oleic Acid (by weight) 50, Olive Oil to 100. Useful for neuralgia. Stronger, *e.g.* 10% is employed as a pigment.

Ⓟ **Unguentum Veratrinæ** (B.P., '98). Veratrine 1, Oleic Acid (by weight) 4 (1 grain = 2 drops); warm gently to dissolve, add Lard 45. Prolonged use may produce rash. Useful for neuralgia and sciatica, rubbed in twice daily.

Ⓟ **Acetum Cevadillæ, E.** Cevadilla Seeds crushed 10, Methylated Spirit 10, Acetic Acid 18, Water 72. Macerate 7 days. P.G. VI is also 10%. For external use. The Germans employed Veratrine extracted from Cevadilla for use in tear shells.—G. Sharp, P.J. i./16,620.

Veratrole, Arsinic Acids derivatives from.—R. G. Fargher, J.C.S., July, 20,865.

Veratri Viridis Rhizoma.—GREEN HELLEBORE RHIZOME.

Dose, in powder.—1 to 5 grains.

The dried rhizome and rootlets of *Veratrum viride* (*Liliaceæ*), imported from and official in U.S. It contains protoveratrine and other alkaloids. Its powder excites sneezing. *V. Album* is similar. A powerful Cardiac, arterial, and nervous sedative. In puerperal eclampsia small doses hypodermically said to be of value, giving chloroform until the veratrum takes effect.

Tinctura B.P.C. 1 in 10 of 90%.—B.P. 85. 1 in 5. *Dose.*—5 to 15 minims.

The U.S. X. Tincture (*average dose*, 15 minims) is 1 in 10 Alcohol 94·9% volume.

High arterial tension in eclampsia, a common and dangerous condition, can be reduced by 20 minim doses hypodermically of a tincture every hour until the pulse is reduced to 60 beats per minute. When pulse begins to rise 10 to 15 minims every hour until it again falls to 60.—B.M.J. ii./12,1127.

Veratrone.—A proprietary preparation 1 Cc. of which is equivalent to 20 minims of tincture. In eclampsia.—B.M.J. i./14,141.

The rhizome of *V. album* (*Liliaceæ*) *White Hellebore*, emetic, purgative and parasiticide, contains alkaloids. Similar to those of *V. Viride.*

Both the above must be distinguished from **Helleborus Niger** (*Ranunculaceæ*), or **Christmas Rose**, which is purgative and emmenagogue and has strong sternutatory properties, and is now little used.

H. Niger and *H. Viride*—a comparative study. It is not possible at present to find any character enabling one to distinguish with certainty between these rhizomes and roots.—T. E. Wallis and A. M. Saunders, P.J. ii./24,90.

Verbascum Thapsus P. Dan. Great Mullein (*Scrophulariaceæ*). Has been used in phthisis; has anodyne demulcent and diuretic properties. Tincture 1 in 8, Alcohol 60%. *Dose.*—20 to 60 minims.

Verbena Officinalis.—Vervain. Has been used as a remedy for epilepsy.

✱ Vescettes. (T.M. 260597). Vescettes are effervescent Salts in compressed form. They are convenient and portable (for various formulæ see Index) and are directed to be crushed and added to a small quantity of water preferably warm—forming a palatable mode of administering drugs of unpleasant taste. Their effervescence aids assimilation and toleration.

Viburnum. BLACK HAW (*B.P.* '14). Ph. Ned. V. Bark of *V. prunifolium* (*Caprifoliaceæ*). Antispasmodic, diuretic, nervine tonic. For dysmenorrhœa and threatened abortion. Extractum Liquidum (*B.P.* '14). *Dose.*—1 to 2 drachms. 1=1 Alcohol 70%. *Flavoring.*—Syl Menth. Pip., Syl Lavand., Syrup Aurant. Tincture 1 in 2 Alcohol 60%. *Dose.*—2 to 4 drachms. Elixir Viburni prunifolii, B.P.C. Liquid Extract 12·5, Compound Tincture of Cardamoms 7·5, Aromatic Elixir to 100. Compound Elixir, B.P.C. is Liquid Extract of Viburnum 50, Dry Extract of Hydrastis 1·75, Oil of Coriander 0·5, Oil of Caraway 0·5, Glycerin to 100.

Vinca major—Great Periwinkle Herb. Is astringent, and has been used for menorrhagia. Infusion, 1 in 10. *Dose.*—A wineglassful frequently. Liquid extract, 1 to 2 drachms.

Mr. E. Whyte, Native Registration Officer at Greyville, Natal, a diabetic sufferer, relates (Oct. 1923) that after taking a decoction of the fresh leaves for 3 months his health improved and at the end of 10 months he was cured. Other similar cases are recorded; in conjunction with dieting, it is said to be curative. *Directions* are: ' Boil 30 leaves in 3 cups (say 15 ounces) of water slowly; take one cup three times daily.'

Viola Odorata.—Has been used in cancer both internally and externally as a **Liquid Extract** (2=1 of fresh leaves), *Dose.*—Internally, 1 drachm; and **Liquor Violæ Glucosidi.** *Dose.*—½ ounce thrice daily.

Syrupus Violæ.—Macerate fresh *flowers* 2 in alcohol 90% 1, 8 hours, press and add water to 2, filter and add syrup 18, used as flavoring.

Ionone.—Artificial violet perfume is made by action of alkalis on a mixture of Citral and Acetone in presence of water. It has composition $C_{13}H_{29}O$, and is an oily liquid with Sp. Gr. 0·935. It contains *a*-ionone (Sp. Gr. 0·932), having the sweeter odour, resembling Orris, and *b*-ionone (Sp. Gr. 0·946) which more resembles the fresh violet flower.—P.R. July 5, 1914, p. 184.

Viola Tricolor.—Flowering plant of Wild Pansy. Is stated to contain Glucosides similar to *V. odorata,* also Salicylic Acid. Is used externally as an ointment, and a poultice. *Dose.*—10 to 60 grains in infusion. An infusion in milk 1 in 10, useful in acne vulgaris.

Viscum album.—Mistletoe (*Loranthaceæ*). The berries are said to be emetic and purgative. The plant contains Viscin, a kind of birdlime—Japanese Birdlime, which has been used as a plaster and is largely employed for making sticky fly-papers. Has been given for epilepsy and hysteria. *Dose,* in powder 10 to 60 grains. Recommended for chorea.—W. W. W. Liquid Extract 1 = 1. *Dose.*—15 to 60 minims.

Hyperpiesia treated by extract of viscum injections intramuscularly (5 centigrammes night and morning) and *per os* in pills (15 centigrammes night and morning).—B.M.J.E. ii./26,17.

In albuminuria said to be of value. Solid extract used, 0·1 to 0·3 Gm. per diem; acting best when blood pressure and tension is high.

✱ Guipsine (T.M. 310351) **Pills** stated to contain 0·05 Gm. of active principles of this drug. Fresh mistletoe contains a volatile alkaloid and two saponins and emetic and cathartic resin. Guipsine is stated to contain all these excepting the resins. It lowers arterial tension due to a central vaso-motor action, and is without any depressing action on the heart itself. For use in arterio-sclerosis.

Xanthoxylum.—Dried bark of *Xanthoxylum Americanum* (Miller), Northern Prickly Ash; or of *X. Clava-Herculis* (Linné), small (Southern) Prickly Ash (N.O., *Rutaceæ*). Fluidextractum. U.S. IX. 1=1. *Average dose.*—30 minims. Hydro-alcoholic Stimulant, employed in rheumatism.

For further varieties of Xanthoxylum, see Edn. XVIII. p. 867.

Yagé. A note on.—E. M. Holmes, P.J. ii./27,111. See also Y.B.P. '27,262.

Yerba Santa (*Eriodictyon glutinosum* or *E. californicum*).—Leaves are aromatic and sweetish, often agglutinated together; they are stimulant in bronchitis, phthisis, and other catarrhal affections. Fluid extract, 10 to 40 minims. *E. californicum* is Official in U.S. **Fluid Extract** 1=1. *Average dose,* 15 minims. Contains crystalline Eriodictionone $C_{15}H_7O\,(OCH_3).(OH)_4$.

P1 ✱**Yohimbine** (T.M. 232617). **Hydrochloride,** $C_{21}H_{26}O_3N_2.HCl$ = 390·689. P.G. VI. The salt of an alkaloid obtained from Yohimbe bark, *Pausinystalia Yohimba* (*Rubiaceæ*) is a reputed aphrodisiac. 1% solution in Alcohol. *Dose.*—5 to 15 minims. Yohimbe is used by the Cameroon natives. Yohimbine Nitrate is soluble 0·9% (=1 in 111) in water. M.Pt. 276° C.

Manufacture.—According to Patent 11,647 of 1900 (expired 1914) the Yohimbehe bark is extracted with dilute Acetic Acid and the liquor precipitated with Sodium Carbonate and the alkaloidal base recrystallised from Alcohol. Melting point 234° C.

Ⓟ**Tablets** contain 1/13 grain. *Dose.*—1 thrice daily; may be increased to five. It has erotic powers. If the internal administration not successful, injections of 7 to 15 minims (½ to 1 Cc.) of a 1% solution may be tried.

A few drops of a solution ½ to 1% strength act as an anæsthetic when applied to the cornea.

True Yohimbe bark contains at least 4 alkaloids totalling 0·3 to 1·5%.—P.J. ii./07,783. History, botanical sources, chemistry, tests and characters of Yohimbe.—Prof. J. Small, P.J. i./22,283. Genuine Yohimbe Bark is from *Pausinystalia Yohimba.* Histological characters and reactions, *ibid.* 311.

Yohimbé alkaloids.—Y.B.P., '27,56-59.

Seven Tablets of Yohimbine gr. 1/13 produced a sense of heart failure, cold sweats, severe frontal headache, great depression of spirits, muscular weakness. —C. W.

Four to seven daily injections of 1 mgr. had lactogogue effect.—Y.B.P. '26,225.

Experiments on bitches seem to show that Yohimbine possesses the property of affecting ovarian nutrition by inducing a constant supply of blood to the ovaries. Mammary secretion was also stimulated. When excessive doses are given nervous irritability is produced. Experiments abroad on male animals indicate an aphrodisiac effect.—P.J. ii./09,184.

Yohimbine Comps. (Arsenate, methylarsinate, etc.).—J.S.C.A. i./1919,549.

Assay of Yohimbé Bark.—P.J. ii./25,17.

Zingiber (*B.P.* '14). Dried rhizome (scraped) of *Z. officinale* (*Scitamineæ*). *Dose.*—5 to 15 grains. Must yield 5% to Alcohol and 8·5% to Water. P.G. VI. has the rhizome not scraped. **Fluidextract.** U.S. 1 = 1, alcoholic. *Dose.*—8 minims. **Syrup** (*B.P.* '14). *Dose.*—½ to 1 drachm. Ginger 1, Alcohol 90% *q.s.* to 2 by percolation, add Syrup *q.s.* to 40. **Pulvi Aromaticus U.S. IX.** *Dose.*—15 grains. Saigon Cinnamon 35, Ginger 35, Cardamom 15, Nutmeg 15. **Tinctura Carminativa**, B.P.C. *Dose.*—2 to 10 minims. Essence of Ginger 6·25 (B.P. 1885), Cardamom Seeds, bruised, 6·85, Oil of Cinnamon, Oil of Caraway and Oil of Clove of each 1·04. Macerate the Cardamoms in Alcohol (90%) 75 for a week, decant, express, and dissolve the oils in the mixed tinctures, adding Alcohol (90%) *q.s.* to 100.

Tinctura Zingiberis Fortior, Essence of Ginger, B.P. 1885, Ginger 1, in Alcohol (90%) 2. *Dose.*—5 to 20 minims. **Tinctura Zingiberis** (*B.P.* '14). *Dose.*—30 to 60 minims. 1 in 10 Alcohol 90%.

Gingerin. *Dose.*—¼ to 1 grain. The treacle-like oleo-resin of ginger made by percolation with ether or acetone and subsequent evaporation. Added to purgative pills to prevent griping. **Gingerol** of Grier confirmed by A. Lapworth. It has been converted into a crystalline derivative and further broken down by the latter investigator into a crystalline pungent principle. Finally gingerol has been synthetised on these lines.—P.J. i./17,201. See also ii./17,172,205. **'Hippocras'** *Dose.*—As required, Ginger, Cloves, Mace, Nutmeg, Galangal, of each 1 drachm, Cinnamon 2 ounces, White Wine 1½ gallons, Sugar 40 ounces, Digest 3 days. Stomachic and antispasmodic.—From an old herbal.

Mistura Carminativa *Dose.*—½ ounce (15 Cc.). Tincture of Ginger 3 drachms, Compound Tincture of Cardamoms 9 drachms, Tincture of Capsicum 1 drachm, Spirit of Ether 3 drachms, Spirit of Chloroform 1½ drachms, Peppermint Water to 6 ounces. A dose every 2 or 3 hours useful in dyspepsia.—Sir W. H. Willcox.

Ginger cultivation in Jamaica.—P.J. i./26,324.

VACCINES AND ANTITOXINS.

Vaccine Therapy may be defined as—"to exploit in the interest of infected tissues, the unexercised immunising capacities of the uninfected tissues"—in other words, to stimulate the chemical machinery of the patient to elaborate the required specifically bacterio-tropic substances. In some infections, *e.g.* furunculosis and other staphylococcal infections, and in bronchitis and other infections of the respiratory tract due to the pneumococcus, the results have been striking. In many other diseases, such as typhoid fever, gonococcal infections, septicæmia and endocarditis, encouraging observations are on record. Vaccines have given valuable results in the prophylaxis of disease.

With regard to the **Antitoxin Treatment** Behring showed that the toxins of the diphtheria bacillus when injected into a suitable animal effected an immunity, that the serum of this animal gave protection against the disease when injected into another, and that it could be employed for treating the disease in the human body.

The antitoxins contained in this animal blood serum combine with the toxins in the blood and tissues of the sick person; by so doing they *neutralise the power of the toxins*, and thus he recuperates.

The Toxins of diphtheria and tetanus are extra-cellular "soluble" toxins excreted by the bacteria, found in the fluids in which they are cultivated. But in the case of typhoid and plague, the toxins are apparently inherent in the bacterial cell; and anti-endotoxins are not readily produced.

Antibody is a substance found in the blood serum, resulting from the inoculation into the animal of a foreign *protein* termed its *antigen.* Thus, if a foreign protein, *e.g.*, egg albumen be injected, the blood serum acquires a new property, that of precipitating a solution of egg albumen, such as was used for the injection. Here the albumen is the antigen and the new property is assumed to be due to a new substance—an antibody called *precipitin.* Antibodies are always *specific,* for example, diphtheria toxin acting as an antigen leads to the production of diphtheria antitoxin which has no action on the toxin of tetanus. Antibodies may be classified according to effect produced on combining with corresponding antigen, thus:—

Antibody.	Antigen.	Action.
Antitoxin	Toxin	Neutralisation.
Precipitin	Coagulable Protein ..	Precipitation.
Agglutinin	Cells, bacteria, etc. ..	Clumping.
Cytolysin (including Bacteriolysin and Hæmolysin).	Cells, bacteria, etc. ..	Prepares cells, bacteria, etc., for solution by complement.
Opsonin	Cells, bacteria, etc. ..	Prepares cells, bacteria, etc., for ingestion by leucocytes.

It is not certain that opsonin should be classed as an antibody. Possibly all the true antibodies play the part of an opsonin.

Two substances are required for the lysis of the microbe—the so-called *immune body* produced during the injection treatment—the other known as the *complement* exists already in Normal Serum

l is not elaborated in increased quantities by the injections. The
nune body is supposed to possess two affinities, one of which
ds it to the bacterium and the other satisfies itself by combining
h the complement. The possession of this double affinity of the
cteriolysin is recognised in its name of amboceptor. It must be
garded as an intermediary body which on being added to the
cteria during the process of immunisation gives the complement,
sting already in the blood serum, the power of attacking them.
e complement—not the immune body, destroys the bacteria.

In antitoxin treatment, a serum which already contains the anti-
xin is introduced into the patient's circulation and this has the
wer of uniting with the toxin to form an inert substance. Con-
ast this with *Vaccine* treatment wherein the tissues of the body
e stimulated to form the necessary antibodies for themselves.

Immunity may be (1) *Natural* where the organism is naturally
usceptible to the infection; (2) *Acquired* (*a*) developed as result
recovery from infective disease, or by artificial introduction of
adually increased doses of bacteria or toxin—this is *active im-
inity*; (*b*) produced by introducing an antibody to the infecting
bstance in the shape of animal serum previously immunised,—
is is *temporary* or *passive immunity.* When a person is exposed to
fective disease there may be natural immunity, or he may acquire
me and develop power to resist the poison. On recovery, im-
inity will persist for a longer or shorter time rendering him less
ble to contract the disease again. In the future, antibodies may
ssibly be increased in the organism by methods other than the
jection of dead bacilli.

Immunity Reaction consists essentially in the exercise of certain
pacities of *defence* on the part of the body cells in response to
e exercise of certain capacities of *offence* on the part of bacilli,
cci or protozoa, which cause the disease. The types of immunity
ay be divided into '*acquired,*' *i.e.,* that depending on previous
ercise of capacity of recovery by the immune individual, and
atural,' which is an innate character arising through the selection
more resistant individuals during racial experience of disease, and
ke all *innate,* as opposed to *acquired* characters, it is transmitted
om parent to offspring. The albino rat, for example, is said to be
nmune to anthrax, or at any rate the absence of pigment (for some
nexplained reason) points to an immune type. In cancer, on the
ther hand, the absence of pigment in the rat is associated with in-
eased susceptibility to cancer on implantation. The *receptors*
lisease toxins can be regarded as food), must, in such animals, be
capable of affording anchorage to the toxins of such organisms.
he rabbit is insusceptible to the action of belladonna,—a poison to
ther species of rodents,—it is dissociated and assimilated or excreted
y the body cells just like ordinary food material. Natural immunity
a *positive kind, e.g.,* in the case of individuals more or less immune
tuberculosis consists in a perfected form of recovery response
tablished during vaccine experience of the disease in which the
ody cells or special defensive cells, or body fluids or both,

immediately respond without the necessity for any preliminary training or any attempts on the part of the disease organisms to invade the tissues.

Certain practical aspects of immunity.—R. A. O'Brien, B.M.A., 1927, B.M.J., ii./27,975. Biological principles in immunity, *ibid.* 978.

Sucking a Wound.—A theory has been put forward that when an animal sucks a wound, the bacteria and their toxins enter the gastro-intestinal tract and the toxins are absorbed especially through the tonsils. Antibodies are then produced all through the body exactly as happens when a vaccine has been prepared and administered in an infinitely more complicated fashion. In part support it is pointed out that the only severe infections from which animals suffer are those of the head, a part. which in the nature of things, cannot easily be licked.—P.J

Local immunity in infectious diseases.

Besredka claims that certain tissues have a very low resistance for certain bacteria, though the other tissues may be able to deal with them easily. Hence, he argues, if the weak tissues be immunised the whole animal becomes immune to the infective organism. Thus he claims that the skin is the weak spot in the case of anthrax, staphylococcic, etc., injections, and the gut wall in typhoid, dysentery, etc. If these are immunised by local treatment then the animal becomes immune. He also says this is not accompanied by the formation of antibodies in the circulation.

Following on the results obtained in anthrax infection, experiments were carried out to determine whether the facts observed were also applicable to staphylococcus and streptococcus infections. A large number of cases of infections localised in the skin or in the bone have been treated with antibacterial dressings. In the majority of cases the filtrate of the broth culture was employed. Furunculosis, boils, osteitis, osteomyelitis and various infections, with or without fistula, were treated with success. (This is supposed to justify the theory that vaccine therapy should be based not on antibody production, but by direct vaccination of the receptive cell, but unfortunately similar results can be obtained with plain broth.)

According to the conception of Besredka, vaccine therapy aims less at curing the diseased cells, but more to protecting those cells which are still well. In order to employ the vaccine in a rational manner, it should be applied to the region of the receptive cells.—Abstract of paper by Prof. Besredka, read by H. Plotz before the Roy. Soc. Trop. Med. Trans., Vol. 17, Jan. '24.

A study of the use of dysentery vaccine *per os* was undertaken by the Medical Section of the League of Nations, and comprised the vaccination of 29,880 refugees in camps in Greece. As a result of the treatment not one person contracted the disease, and in those regions where dysentery was epidemic this method of vaccination had completely stopped the epidemics.

Bacteria injected into the stomach are destroyed. Organisms so injected are never found at a higher level than the point where introduced. Gastric juice and intestinal mucous membrane are good barriers against the passage of bacteria into the body. Bacteria taken into the mouth may be absorbed through the buccal and pharyngeal mucous membrane—exact point not definitely established. Bacteria introduced into the body by any route are always excreted into the intestinal tract.—Teale and Embleton, B.M.J. i./22,437.

Gratia repeated Besredka's experiments and finds that though his facts are partly correct his explanation is very doubtful. He agrees that guinea-pigs can be protected from anthrax by cutaneous innoculation but states that the report of no antibody formation is unfounded, as he has demonstrated the presence of agglutinins even in a dilution of 1 : 10,000. He considers the most likely interpretation is that when the bacilli are injected into the skin they are able to multiply and give off their toxic properties, to which the animal reacts by forming immune bodies. Besredka's hypothesis of local immunity is not in agreement with observed fact.—A. Gratia, per B.M.J.E. ii./24,72.

Antivirus as a wet dressing in suppurative conditions. Pain relieved and healing accelerated in acute mastitis, paronychia, whitlows and furunculosis.

lso employed in puerperal sepsis, ulcerative stomatitis and periodontitis. .M.J. i./27,1020; see also E. C. Plummer, *ibid.* ii./27,46.

DIGESTIBILITY OF BACTERIA. Although of nitrogenous base, bacterial cells e not digested by powerful proteolytic ferments. They can live and multiply solutions which split up proteins of which by chemical analysis they have en shown to be composed—hence their vitality in the intestinal tract. igestion and adsorption experiments. Their lipoidal envelopes protect them -C. E. Dukes, B.M.J. i./22,430.

Bacteriophage.—F. W. Twort in 1915 described the fundamental characters the filter-passing lysin—or virus—associated with different bacteria. It as shown that it infected bacteria and could be transmitted from culture culture. Two years later d'Herelle, of the Pasteur Institute, gave the name acteriophage' to the contagious filter-passing material causing bacterial sis.—L. i./25,845.

The action of bacterial lysin on dead bacteria.—F. W. Twort, L. ii./25,642. d'Herelle says that the bacteriophage is a living corpuscular element, dependent of the lysed bacteria, which displays vital properties of assimilaon and adaptation.—Comptes Rend., per Jl. A.M.A. ii./25,1337.

The bacteriophage is not a living virus but a lytic substance produced by e bacteria themselves.—J. Bordet, Ann. de l'Instit. Pasteur, Sept. '25, er Jl. A.M.A. ii./25,1675.

Persistent differences observed in the individual resistance of lytic filtrates gainst different micro-organisms favour the conception of a multiplicity of acteriophages.—Jl. A.M.A. ii./25,2038.

Results with the specific bacteriophage in staphylococcal and other infections. -B.M.J.E. ii./26,100.

The bacteriophage is widely distributed in nature (though chiefly obtained om intestinal tract of man and animals), *e.g.*, in pathological tissues, exudates, acterial cultures, soil and water. Can only be propagated in living bacterial ltures and is a product of bacterial growth rather than of bacterial disinegration.

ACTION OF BACTERIOPHAGE UPON BACTERIA MAY BE SUMMED UP AS FOLLOWS: xposed to the action of bacteriophage many bacteria become phagogenic, rown in presence of bacteriophage the virulence of many organisms is altered, e cultural properties of the bacteria and the character of solid colonies may lso be altered; the antigenic properties of bacteria may be modified by the acteriophage and the bacteria are killed and lysed. Organisms most sensitive the bacteriophage are members of the typhoid-dysentery-colon group, ss susceptible organisms including diphtheria bacillus, plague bacillus, the acillus of hæmorrhagicsepticæmia, staphylococci, streptococci and the cholera ibrio. Variation in virulence is a marked characteristic. It is extremely table to heat and chemical reagents. Also possesses antigenic powers and arious antibodies can be obtained by appropriate manipulation. While 'Herelle holds it is an ultra-microscopic living organism capable of preying n living bacteria, others hold that it is a ferment or catalytic agent and ateshima suggests name 'Ferment d'immunité bacteriolysant.'—Jl. Trop. led., Sept. 15, '26,323.

The bacteriophage, though probably only about 20$\mu\mu$ in diameter, is thought be a living organism, and the contention is supported by the action on it f various antiseptics such as Mercuric Chloride, Phenol and Chloramine, to e deleterious influence of which the bacteriophage can be accustomed. he nature of the bacteriophage, C. Prauznitz, L. ii./27,535, *ibid.* 559.

A number of further (earlier) abstracts in Edn. XVIII. p. 873.

INTIMATE STRUCTURE OF THE BACTERIAL CELL.—D. Ellis, B.M.J. ii./22,731.

Anti-Sera are always made as **Polyvalent** as possible, *i.e.*, many trains of the bacterium are employed for inoculation.

In the **preparation** of **Anti-toxin** the toxin is injected subcuaneously into the animal, *e.g.*, the horse, with strict aseptic precauions. The toxin is usually at first mixed with anti-toxin or the nimal has a large protective dose of anti-toxin given before the noculation is started. Some reaction, rise in temperature and nalaise occur. Further injections are made at intervals. The uantity injected is gradually increased, and subsequently the injections may be intravenous. The blood is removed from the animal by the aid of a large sterilised canula, from the jugular vein, 6 to 12 litres may be collected in sterile flasks. The clot is allowed to form by standing 24 to 48 hours, and the serum is decanted into sterile bottles after the addition, by some manufacturers, of 0·3% of Trikresol or 0·2% of Phenol.

Some of the disadvantages of Serum Therapy.—Certain types of bacteria, *e.g.*, the *Streptococci* and *B. Coli* are only general names for very numerous families, and the antibodies efficient against one member may be altogether without effect on another member of the family. Polyvalent sera have been attended with some success but many failures may still be ascribed to this difficulty. Further, the added immunity in the use of a serum is limited in kind and extent. They may be deficient in certain necessary properties, *e.g.* may not be sufficiently anti-endotoxic, etc. Again, the Serum may render the patient hypersensitive to future injections of serum from that animal from which the antiserum was prepared. To guard against this it is necessary to inquire before use whether and when the patient has been previously treated with an antiserum.

Coming now to the more detailed consideration of **Vaccines** the following table, giving approximate initial doses for treatment and for prophylaxis in the adult, which we have arranged, should be useful for reference :—

Table of Vaccines.

Arranged alphabetically.

	PROPHYLACTIC DOSE.		THERAPEUTIC DOSE.	
VACCINE.	INITIAL.	FINAL.	INITIAL.	FINAL.
Acne Bacillus ..	Not used.		5 mill.	500 mill.
Actinomycosis ..	,,		5 ,, or 0·001 mgr.	100 ,, 0·02 mgr.
Cholera	500 mill.	2000 mill.	Not used.	
B. Coli	100 ,,	2000 ,,	5 mill.	500 mill.
Combined for Colds	100 ,,	1000 ,,	50 ,,	1000 ,,
B. Diphtheriæ ..	Not used.		25 ,,	500 ,,
B. Dysenteriæ ..	500 mill.	2000 mill.	5 ,,	1000 ,,
B. Friedländer ..	250 ,,	1000 ,,	5 ,,	1000 ,,
Gonococcus ..	Not used.		25 ,,	1000 ,,
Hay Fever	25 units.	1000 units.	25 units.	500 units.
B. Influenzæ ..	100 mill.	2000 mill.	10 mill.	2000 mill.
M. Catarrhalis ..	250 ,,	2000 ,,	10 ,,	1000 ,,
M. Melitensis ..	1000 ,,	2000	50 ,,	1000 ,,
Meningococcus ..	Not used.		50 ,,	2000 ,,
B. Ozænæ	,,		50 ,,	1000 ,,
B. Pestis	500 mill.	1000 mill.	50 ,,	1000 ,,
Pneumococcus ..	250 ,,	2000 ,,	10 ,,	2000 ,,
B. Pyocyaneus ..	Not used.		5 ,,	1000 ,,
B. Septus	250 mill.	2000 mill.	50 ,,	2000 ,,
Staphylococcus	Not used.		100 ,,	1000 ,,
Streptococcus ..	250 ,,	2000 ,,	5 ,,	1000 ,,
Strepto. Rheumaticus	Not used.		5 ,,	1000 ,,
Strepto. Scarlatinæ	500 mill.	2000 mill.	5 ,,	1000 ,,
Tuberculin, A.F. ..	Not used.		0·00001 Cc. upwards	
,, **B.E.** ..	,,		0·00001 Cc. upwards	
,, **T.R,** ..	,,		0·00001 Cc. upwards	
Tuberculins, Various, see Tuberculin Chapter.				
B. Typhosus (and B. Paratyphosus)	500 mill.	2000 mill.	50 mill.	1000 mill.
B. Whooping Cough	500 ,,	2000 ,,	5 ,,	2000 ,,

In ***Prophylaxis*** the above doses are suitable in the majority f cases. The **Intervals between doses** should never be less than days and may be extended to 14 days with advantage.

In ***Treatment*** as regards dose it is a safe rule to follow that the nore acute the infection and the more 'toxic' the patient the maller the initial dose. The doses above stated are sufficiently mall except possibly in severe generalised infections with marked oxæmia in which perhaps the dose may be halved. As regards ***ntervals*** there is no general rule but the smaller the dose the horter should be the interval between doses. Thus in septicæmic ases where minimal doses are employed these may be required daily r every other day. Clinical signs, the focal and general reactions fford the necessary guidance.

Combined Vaccines. The simultaneous use of a combination of rganisms does not entail reduction in doses of the constituents.

Doses for Children:—

nder	3 years.	1/5 adult dose.	From	7–10 years.	1/3 adult dose.
rom	3–7 years.	1/4 adult dose.	From	10–14 years.	1/2 adult dose.

arieties of Vaccines.

The following are in use :—

(1) The ordinary type of vaccine which is a suspension (emulsion) f the killed or attenuated bacteria in Normal Saline with, as a rule, % Phenol or Trikresol as antiseptic.

(According to the *Therapeutic Substances Act*, 1925, the nature and he percentage proportion of antiseptic substance must be stated on he label—subsequent to Feb. 6, 1928.) *Further on the Therap. ubstances Act, see p.* 1023.

(2) **Sensitised Vaccines.** Suspensions of the dead or living rganisms which have been treated with the corresponding Antierum with the result that certain antibodies in the serum enter nto close combination with the bacteria. Gibson's Antidysenteric accine may be mentioned as an example.

(3) ***Detoxicated Vaccines** (T.M. 392346). Thomson evolved ne idea of treating bacteria, *e.g.*, the gonococcus, with an alkaline lvent, whereby the stroma or bacterial protoplasm and the toxic ndotoxin are dissolved. On treatment with acid or acid salt the roma is again precipitated, the idea being that the toxin is in the lution—the latter is rejected and the bacterial substance, after ashing and suspending in slightly acid medium, is used theraeutically. (*See* L.i./19,374,1102,1123; i./21,795,849.)

(4) The toxic products of the bacterial growth, either *e.g.*, as in e case of Mallein in an albuminous medium, or as in Tuberculin A.F." in a medium which is protein-free. The former clearly ontain the products of metabolism of the protein-containing edium, while the latter contains only the toxic excretions of the acilli and small amounts of endotoxin liberated by autolysis.

Preparation and Standardisation of Vaccines:—

A Vaccine is best prepared from the organism isolated from the atient, but in case of *B. Tuberculosis* this is not essential, and there are many obstacles in the way in other diseases, *e.g.*, in the case of *Gonococcus* it may be difficult to secure a pure culture, and the loss of time may be of immense importance. In the case of tubercle a stock Tuberculin is used while a special one is being prepared from the case.

The organisms are then devitalised by a temperature of 60° C. for 1 hour, and the Vaccines introduced into ½ and 1 Cc. tubes. Preservative, *e.g.* Trikresol or Carbolic Acid as mentioned, is added. The vaccine is standardised by direct counting, comparison with various standard tubes or by the opacity method of Gordon.

Standardisation of Vaccines—a note on the McFarland, compared with the Brown and Kirwan methods.—Maj. H. C. Brown, L. ii./25,941, 995.

Interaction between the tissues and the dead micro-organism occurs by which antibacterial substances are liberated into the blood stream. The reaction, by reason of the minute dose of dead bacteria and the magnitude of the response in the tissues, may be compared with the prolonged action of enzymes. The Antitoxins in a *serum* probably act simply by combining with the toxin and rendering it harmless in proportion to the relative amounts of the two substances—any further action being due to the presence of bacterial protein in the serum, which acts as a feeble vaccine. The theory of **Immunisation** depends on the human being having a sufficiency of anti-bacterial substances to kill off the infecting organism. If the latter gains access and colonisation begins, the destruction of a portion of the invaders strengthens the defending force. This phenomenon—(**Auto-inocculation**) is best seen in the pneumonic crisis, or in the rise of protection after a crop of boils. The protection may be lasting as in smallpox, or very transient, as in tuberculosis.—A. Butler Harris, Pr. i./09,647.

The bacterial invasion, if not too large, may as the result of the destruction of a few of the bacteria in question, lead to self immunisation and recovery, and the introduction of a bacterial vaccine may form the turning point, producing, as it does, the reinforcement of the defending forces that was necessary.

As regards **Immunising power**, the following is a rough **order of Merit** of some vaccines, commencing with the most potent :—

Pneumococcic Vaccine and
Catarrhal organism Vaccines
(excluding Influenza)
Typhoid Vaccine.
Gonococcic ,,
Streptococcic ,,
B. Coli Vaccine.
Acne and Staphylococcic Vaccines.
Influenza Vaccine.
Dysentery Vaccine.
Cerebro-Spinal Meningitis Vaccine.

***Dose* of *Vaccines*.**—In order that an adequate supply of immunising substances may reach the part the stimulus applied to their formation must correspond, and measures must be taken to increase their accessibility to the part. Thus in a *septicæmia* the bacteria and their toxins are speedily carried to the site of formation of immune bodies ; this also holds to a less degree, say, in the case of a *prostatitis*, and to a much less degree for an infection located in the *skin, cornea* or *conjunctiva*. In the case of a *gonococcal septicæmia* the correct initial dose is, therefore, smaller than in the instance of a *gonococcal prostatitis,* whilst for conjunctivitis the increase in dosage must be correspondingly greater. For a severe *pneumococcal septicæmia* an initial dose of ten millions will suffice; for an established *pneumonia* where the pneumococci are certainly in the lung tissues and probably in the blood, twenty-five millions may be employed; for a *pneumonic catarrh* where the pneumococcus is located in the mucus and superficial tracheal or pharyngeal cells fifty or a hundred millions may be requisite; finally, for a *pneumococcal keratitis* or *ulcus serpens corneæ,* a minimum of 250 millions may alone avail. The relative toxicity of the vaccine must also be taken into account. This depends partly on the organism in question, partly upon the method of preparation; *overheating a vaccine for sterilisation purposes materially increases its toxicity.* The toxicity of a staphylococcal vaccine is but slight, that of one of the *Bacillus Coli* considerable; the initial dose in toxæmic conditions of the former vaccine may, therefore, be greater than that of the latter; still the amount of toxin introduced along with even a considerable dose of vaccine must be relatively very small. The focal reaction when this can be observed in the first place and the general or constitutional reaction in the second, *i.e.*, pulse, temperature, general condition, and clinical signs and symptoms, with a bacteriological examination of the secretion, if any, act as complete guides in determining future doses and intervals.

Too large a dose of Vaccine would cause an unpleasant reaction, and it would do harm by diminishing instead of increasing the patient's resistance. Not only must the proper dose of Vaccine be given but the successive doses must be spaced and not given too close to one another.

General References to Vaccine Therapy.

The application of Vaccine Therapy is limited *first* by the fact that the capacity for antibacterial response in the body is limited, *secondly* by the existence of individual peculiarities of disease manifestations, *thirdly* by the fact that we are still in the dark as to the means to be adopted to bring out the highest degree of antibacterial response. The body fluids containing antibacterial substances must have free access to the focus of infection—*cf.* the difficulties in tuberculosis and typhoid carriers (in which latter the Bacilli are multiplying on free surfaces of the body). There are no hard and fast rules regarding dosage and intervals.—L. ii./10, 1626.

EYE WORK.—Correct diagnosis essential. *Ophthalmia neonatorum* depends on infection of several organisms—the Gonococcus, Streptococcus, Staphylococcus and others. In Vaccine Therapy, by imitating nature, antibodies are created at the site of injection, distant from the original infection, and these circulating in the blood stream exert a beneficial effect on the distant lesion. Tuberculin, Staphylococcic and Streptococcic Vaccines, as also Gonococcic Vaccines, have proved themselves of value in eye work.—J. W. H. Eyre, B.M.J. ii./10,1310.

Clive Riviere quotes such methods as poulticing and fomentations as examples of "Empirical Vaccine Therapy." "Irrigation often constitutes auto-inoculation." In infections of the mucous membranes, *e.g.*, bronchitis, the increased flooding (by means of Emetine, Salts of Antimony, Apomorphina and the Iodides) of the mucous membrane with healing serum is no small element in their favourable result. All these drugs cause a watery exudation through the bronchial mucous membrane. In the same way Squill and Ammonium Carbonate, besides being expectorants, are gastro-intestine irritants and emetic in full doses. Thus they increase the secretion from the bronchial mucous membrane and at the same time raise the general blood pressure by their action as vaso-motor and cardiac tonics, hence increase the blood supply to the bronchial tubes by both systemic and pulmonary blood channels.—L. i./11,220.

Autogenous Vaccines, *i.e.* Vaccines prepared from cultures obtained directly from the patient, should be used (*a*) when the infecting agent belongs to an ill-defined group, *e.g. B. Coli* infections; (*b*) when the infection is severe and it is felt to be too great a risk to wait and see whether stock vaccine is effective; (*c*) when treatment with stock vaccine has failed.—A. Fleming, B.M.J. i./21,254.

Autogenous Vaccines, advantages of. Recent advances in vaccine therapy —H. E. Annett, B.P. Conf., 1919.

Technique of Injecting a Vaccine.

The skin should be sterilised with Iodine or Diluted Cresylic Disinfectant; too strong applications should be avoided.

The best sites are: (1) the arm, preferably the upper arm near the insertion of the deltoid, (2) 1½ inches below the centre of the clavicle; (3) high up on the buttock near the spine; (4) the flank.

The inoculation may be made either into the subcutaneous tissue as sites (1) and (2) above or into the muscles (site 3). The ampoule should be shaken before use, as the emulsions settle.

Vaccines are occasionally given *by the mouth*; this should only be done when subcutaneous use is contra-indicated, as in marked skin infections or other special reason. The stomach should be free from food and the vaccine should be diluted to 10—20 Cc. with normal saline. In cases with furred tongue or catarrh of the stomach this method is contra-indicated. The rectal method should never be employed.

Local and General Effects of the Injection.

(*a*) *Local.*

In 12–24 hours there may be some redness, swelling, pain, and tenderness at the site of inoculation, and for an area of 2–3 inches around it. This affords little or no indication of the immunising response—as many other factors are concerned, *viz.* (1) the volume of the inoculum (which should be small); (2) the amount of antiseptic; (3) the property of the bacillus for forming powerful toxins; (4) the laxity or otherwise of the tissues into which the injection was made; (5) the number of bacteria employed.

(*b*) *General Effects.*—

(1) One of the results of the administration of an appropriate dose of the appropriate vaccine is the production of a local hyperæmia round and in the infected focus; this is best seen in cases of iritis, laryngitis and acute skin infections. (2) Other effects which vary with the dosage are a rise in temperature in about 12 hours, which should not exceed 1·5° F., a rise in pulse rate, which should not exceed 20 beats, a slight feeling of malaise and perhaps a little headache; these should all pass off within 24 hours: if the temperature and pulse were previously unduly high they then should assume a better level, and the malaise and headache should be succeeded by a feeling of increased well-being.

Other clinical symptoms should also improve. If none of these result the dose employed was too small.

The signal for reinoculation is retrogression of the patient or failure to continue to improve.

Increase of dosage is indicated by failure to secure any general reaction, or by mere transitory improvement on the part of the patient.

The more acute the lesion and the greater the toxæmia of the patient the smaller should the initial dose be; in the case of the more chronic lesions a considerably higher (2–10 times) initial dosage may be safely used. When the blood and lymph supply to an affected part is poor, as for instance the skin and cornea, still higher doses are advisable.

Acne.

The **Acne Bacillus,** *Syn.,* **Bottle Bacillus,** may alone be the cause of acne, especially of the non-pustular forms,—in the majority of cases, however, it is associated with the Staphylococcus.

Acne Bacillus Vaccine. *Syn.,* **Acne Bacterin,** is indicated in the above cases where comedones are the principal features. Combination with polyvalent staphylococcus albus vaccine may be advisable. *Initial dose,* 5 millions; then increasing doses—a final dose of 500 millions may be wanted. The interval between doses is 7 to 10 days.

Ampoules are prepared each containing these doses.

For cultivation of the Bacillus and preparation of Vaccine see Vol. II.

Not a panacea. Acne has been made worse by Vaccines.—L. i./11,743.

Vaccine treatment, although occasionally successful, is uncertain—a long course without assurance of good result. Seldom of value in acne punctata. Autogenous better than stock vaccines.—H. G. Adamson, L. i./25,401.

Acne Bacillus and Staphylococcus Mixed Vaccine is prepared as follows:—

Acne, 5 millions with Staphylo. 100 and 250 millions; Acne, 10 millions with Staphylo. 250, 500, 1,000 and 2,000 millions; Acne, 20 millions with Staphylo. 2,000 millions.

Anthrax.

Vaccines have been prepared by cultivating the bacillus under conditions unfavourable to its growth, by which the infectivity is greatly reduced, but they are not on the market, and are not used in human beings. The following serum has been considerably used:—

Anti-Anthrax Serum (Sclavo's). Each tube contains 10 Cc.

An Antibacterial Serum, stimulating the activity of the phagocytes. Prepared by immunisation of asses at Siena in Italy.—(Legge).

Dose.—In three or four different parts of the skin of the abdomen, injections of 40 to 80 Cc. are given at one time. After 24 hours if there has been no improvement either in the general or local condition, further injections of 40 to 80 Cc. are to be made and repeated next day if necessary. *Begin treatment early.*

Rise in temperature following the injection is favourable. Sometimes a rash develops three to eight days after, with or without febrile symptoms: it is unimportant. The Serum *keeps* two years in the dark—a slight deposit in it is negligible. *Technique.*—Disinfect the skin with Ether, and then with a 2 per 1,000 Sublimate solution or with Ether Soap. After injection wash the site of injection again and apply a drop or two of Collodion.

For intravenous injection in severe cases 10 Cc. or more repeated after 2 or 3 hours if necessary into, where possible, one of the superficial veins at the back of the hand, distended by pressure on the forearm.—L. ii./05,803.

Results with Sclavo's Serum.—Reduces temperature and increases feeling of comfort. Wool-workers appear to acquire slight forms of Anthrax giving them immunity. A case of recovery by Sclavo's Serum first intravenously, then in the loin and subsequently *per os.* (Undoubted cases of internal anthrax rarely show the bacillus in blood or pericardial or pleural effusion more than 24 to 36 hours before death, hence justified in diagnosing by clinical symptoms.)—B.M.J. i./11,751.

In a successful case treated there was apparently an incubation period of 10 days,—rapid amelioration after injection and recovery without excision of the pustule,—most cases have been excised.—B.M.J. ii./11,103.

Skin vaccination against anthrax, from experiments on 11 guinea-pigs, confers immunity, including all the organs. The animals proved resistant to several times the fatal dose injected into the brain.—Comptes Rend., July 10, '25, per Jl. A.M.A. ii./25,1259. *See also* our p. 898.

Anthrax Protection.

A disinfection station erected near the wool warehouses at Mersey Docks under the auspices of the Home Office treats **wool** arriving **from the East** by a method by which not only is the natural protection of the anthrax spores removed but the spores themselves are subjected to destructive effect of Formaldehyde. The material is first washed with an alkaline warm soap solution and then disinfected at 102° F. with 2 or 2½% Formaldehyde Solution for 20 minutes in 2 stages of 10 minutes each, then dried and cooled.—B.M.J. ii./21,952. Plate *ibid.* opp. 933.

Seymour Jones' 'Formic Mercury' process. Hides, skins, etc., are treated in the 'soak' process with Formic Acid 1 to 2% and Mercury Perchloride 0·02%.—L.ii./11,1260.

Shaving brushes infected conveyed anthrax—infection probably due to disease in the animals from which the hair used in their manufacture was originally obtained.—R. R. Elsworthy, L. i./16,20. See also E. H. Snell and E. W. G. Masterman, L. i./16,242.

Similar source of infection. The serum promptly used saved patient's life. A swab examined at Torquay from a pustule found to contain Anthrax B. at 11 p.m. 'Phoned to Martindale's for serum which was placed on the train leaving Paddington at midnight. It was administered to patient before 6 a.m. and undoubtedly saved patient's life.—C. Owen, P.J. i./17,62.

Wool and mohair even when washed clean may yet be contaminated with anthrax.—L. i./26,107.

Malignant Pustule.—A variety of external anthrax,—two cases at Brignton. One recovery by excision and painting with raw Carbolic Acid, the other terminating fatally.—Reference is made to the native method of burning out anthrax in the Argentine with a red-hot wire.—L. ii./10,1275.

Auramine suggested for use in anthrax. A dilution of 1 in 5,000 prevented growth and rendered sterile even spore cultures of *B. anthracis.* Suggested that Auramine should be used instead of Formalin to inject into and round the pustule, or to swab the cut surface of the wound after excision of pustule. Not caustic or irritant to tissues and might be tried intravenously in 1 in 20,000.—A. Renshaw, B.M.J. ii./24,504.

Mortality from malignant pustule reduced in Italy to 5·3% since the introduction of treatment by anti-anthrax serum.—B.M.J.E. i./26,42.

Asthma.

Bacteria are not the universal cause of asthma—they are merely one of the excitants of the asthmatic attack. In a number of cases the sputum collected a few hours after commencement of the attack showed :—

B. Influenzæ,	present	in	12%	of cases.
Pneumococci	,,	,,	26%	,, ,,
Streptococci	,,	,,	96%	,, ,,
M. Catarrhalis	,,	,,	72%	,, ,,
M. Paratetragenus		,,	20%	,, ,,

The low percentage of *B. Influenzæ* and *Pneumococci* is very marked but when they occur their significance is correspondingly greater. The almost universal occurrence of the *Streptococcus* group is striking and corresponds to its etiological importance. *Streptococci* are present in almost all cases in which bronchitis symptoms are in abeyance. *M. Catarrhalis* and *Pneumococcus* are the more common in cases in which bronchitis is a marked feature. The Vaccine treatment of asthma is especially difficult owing to possible sudden change of infection.

Initial dose of the various Vaccines required :—

B. Influenzæ 100 millions, **Pneumococcus** 50 millions, **Streptococcus** 25 millions, **M. Catarrhalis** and **M. Paratetragenus** 50 millions. Whether the Vaccine is likely to prove of service or not will be determined by the response to this dose or a double dose.

Autogenous streptococcal vaccines, 100 million micro-organisms per Cc. Initial dose ¼ to ½ Cc., increased. In over 50% the patients remained well for from ½ to 4 years.—Sir L. Rogers, B.M.J. ii./21,71.

Cases of asthma treated by autogenous vaccines which did best had *Streptococci* as almost the only organism in the sputum.—J. R. Collins, B.M.J. ii./21, 220.

Asthma and anaphylaxis. Asthmatics should not receive horse serum. Most of the deaths that have occurred after horse serum have been in the horse asthmatics.—F. Coke, B.M.J. i./21,372,582.

This subject is dealt with on page 664 *et seq.*

TUBERCULIN TREATMENT of bronchial asthma and hay fever. 'T.O.A.' employed subcutaneously; initial dose 1 Cc. of 1 : 100,000 dilution. The authors cannot explain *why* a state of hyper-sensitiveness to tuberculin increases the susceptibility for allergic reactions, nor why small amounts of tuberculin have curative effects.—W. Storm van Leeuwen and H. Varekamp. L. ii./21,1366.

Severe bronchial asthma, resistant to all other forms of treatment, successfully treated by intravenous injection of a vaccine made from germs cultivated from the blood of a patient suffering from septicæmia, and having the capacity of provoking fever and leucocytosis without injuring the organs.—Prof. Schottmüller, per Clin. Jl., April 25/23,204.

Bronchitis and Pulmonary Catarrh.—The bacteriology of bronchitis is broadly speaking the same as that of the common cold. The predominant organisms in their order and occurrence are :—

B. Influenza	present	in	40%.	*M. Paratetragenus*	present	in	23%
Pneumococcus	,,	,,	52%.	*B. Friedlander group*	,,	,,	7%
Streptococcus	,,	,,	53%	*B. Septus*	,,	,,	2%
M. Catarrhalis	,,	,,	72%.	*Streptothrix*	,,	,,	3%

(Sputum to be examined after washing out the mouth and throat, and expectorating into a sterile bottle immediately on waking.)

The marked relative absence of *B. Septus* is notable. The infections of the lower passages are commonly mixed ones. The *pneumococcus* may be regarded as a frequent cause of bronchial catarrh and the most dangerous to the patient. Note also that *B. Influenzæ* may be resident in the bronchi or pulmonary cells without giving localised though marked constitutional symptoms. The sputum voided may be almost *nil.*

Doses of the Vaccines are given under the various headings.

Autogenous Vaccines are more likely to be efficacious than stock ones and it must be remembered that variation in the flora is liable to occur during the progress of immunisation, hence repeated examination necessary.

Bronchitis is pre-eminently suited for Vaccine therapy—old age and a desperate condition of the patient are not contra indications to treatment.

Chronic bronchitis treated with autogenous vaccines. If possible, the sputum should not be allowed to get cold. Nasal cultures to be sent in addition.—L. Mackey, B.M.J. ii./22,715.

Catarrh, Nasal and Tracheal.

The organisms principally involved—either singly or mixed, in setting up acute catarrhal infections of the respiratory tract are the *B. Influenzæ. Pneumococcus, B. Septus, Streptococcus* and *M. Catarrhalis.* The organisms appear in cycles. Thus *B. Septus* may be found in 80 to 90% of the cases in each epidemic for two or three successive years and then disappear altogether for 4 or 5 years.

Combined Vaccine for Colds and Influenza (∗Wimpole Institute, T.M. No. 392346). *Syn.* **B. Influenzæ, Pneumococcus, Streptococcus, B. Septus and M. Catarrhalis Vaccine.** The composition of this vaccine is altered slightly from time to time to suit prevailing epidemics; for general use at present it contains *B. Influenzæ*, *Pneumococcus*, *Streptococcus*, *B. Septus* and *M. Catarrhalis* in the proportions 2 : 1 : 1 : 1 : 1.

Ampoules for Hypodermic Use contain 25, 50, 100, 250, 500 and 1000 millions of each organism respectively with exception of *B. Influenzæ* which is double.

Initial dose.—The contents of an ampoule containing 50 millions of each organism. *Children* of 10 to 15 years receive half doses.

A dose of 100 millions *as a preventive* against colds in those subject to such attacks, followed in 7 days by one of 250 millions, and again after 7 days by one of 500 millions, which may well be repeated or increased to 1000 millions if no marked reaction ensue, has proved very efficacious. It is also suitable for immunising against and treatment of influenza.

The earlier the treatment is begun the better (with patient in bed); inoculation is best in the evening between 7 and 10.

Has proved of value not only in the treatment of catarrhs, acute and chronic, but also in pulmonary phthisis, where bronchitic symptoms are conspicuous—in such cases where Staphylococci or Streptococci are the secondarily infecting organisms no good can be expected from its use.

Bacillus Septus Vaccine.—Infection by *B. Septus* usually begins with dryness or tickling of the soft palate, the inflammatory condition extending within 24 hours to the nasal mucosa, so that sneezing and discharge of thin nasal mucus result, and to the pharynx causing pain in swallowing. Cough other than pharyngeal is not present and expectoration scanty. After three or four days a subacute stage follows the acute. This also lasts about the same time.

The Vaccine is for use in simple cold which has begun with sore throat, where cough and tracheitis are absent. The initial dose of 50 millions may be given at any stage of an attack, best at bedtime, and may be repeated or increased in five days. For immunising purposes a dose of 250 millions should be followed in 7 to 10 days by one of 500 millions, which after another 7 to 10 days should be repeated or increased to 1000 millions. The resultant immunity lasts for 4 to 6 months on this. *Ampoules* contain 50, 100, 250, 500 and 1000 millions.

Friedländer's Bacillus Vaccine.

Employed both in treatment and prophylaxis in treatment of nasal catarrh, alkaline antiseptic douches being used as adjuvants, also of service in chronic bronchitis and urethritis. *Initial dose.*—10 millions.

To be repeated or increased at intervals first of 3 days, then 7–10 days. Ultimate dose 1,000 millions.

Uncomplicated chronic nasal catarrh is very often due to *B. Friedlander*, when the Eustachian tube and middle ear are involved, to the *M. Catarrhalis*, and when the antrum or sinuses are involved, to the *Pneumococcus* and *B. Influenzæ*.

Ampoules contain 50, 100, 250, and 500 million organisms.

Micrococcus Catarrhalis Vaccine.—Of service in nasal tracheal and bronchial catarrhs, both acute and chronic, in bronchitis and bronchitic asthma and in catarrh of the middle ear, when the causal elationship of this organism to the attack has been demonstrated. *nitial dose* of 10 millions may be repeated in 5–7 days. In chronic ases 1,000 millions or more may be ultimately necessary.

Ampoules contain 10, 50, 100, 250, 500, and 1,000 millions.

M. Catarrhalis is one of the constituents of the Combined Vaccine for Colds *ntea. M. Catarrhalis* infections may begin at any part of the respiratory ract—characteristically with an inflamed feeling of the fauces and naso-harynx.

Chronic tracheal catarrh is frequently due to infection by this organism or *I. paratetragenus*, to which secondary infection by staphylococci, streptococci, neumococci, and other organisms may be added, or to the pneumococcus lone. Cultivations from the trachea showed that non-Gram-staining *Cocci* re present in 78% of normal throats, and 68% of catarrhal throats.

M. Catarrhalis is well known as a cause of common colds and of influenza, ronchitis, and pneumonia. Causes very irritable cough with scanty viscid xpectoration. It grows best on blood agar, and produces no acid in glucose roth. *B. Septus* causes a mild pharyngitis with painful throat, muscular ain, with, however, no temperature and little or no nasal catarrh,—probably common cause of stiff neck and muscular rheumatism. *B. Friedlander* ccurs in many acute and chronic colds, and may cause very profuse coryza.

Chronic Nasal Catarrh treated by Autogenous Vaccines; a good proportion f cures.—L. Mackey, B.M.J. ii./19,159.

Directions for taking secretion for preparations of an Autogenous Vaccine.

If in the throat, the mouth is to be washed out in the morning with sterile water, and the throat to be gargled, as also teeth washed with same, then atient is to spit once into a sterile bottle. If, on the other hand, the infection is in the nose, the entrance to the nostrils should be washed with soap nd water and discharge blown into a sterilised bottle, or better, post-nasal wabs should be taken.

Vaccines by the Mouth.—These catarrhal (and other) Vaccines are ccasionally ordered to be taken *by the mouth* on an empty stomach, but the nethod is little used and not recommended.

Immunisation by the mouth. At one time the opinion was 'pro' but later con'—the mere possibility of efficacy was questioned in view of the extent to which foreign protein is broken down in amino-acids before absorption by the intestinal mucosa. Account of Besredka's work (1918—Paratyphoid) and subsequent tests in the case of human volunteers who took *per os* large quantities of dead organisms of Malta fever and dysentery. The Malta fever volunteers inoculated with virulent cultures of *M. melitensis* remained healthy. In the case of dysentery satisfactory controlled experiments were difficult to arrange but there was much conclusive evidence.—Leader, L. ii./22,921.

See also our p. 898 *and* **Influenza and Pneumonia.**

Cerebro-Spinal Fever, *Syn.* **Cerebro-Spinal Meningitis. Malignant Purpuric Fever, Petechial Fever, Spotted Fever.**

Characters of Cerebro-Spinal Fever.

It is an acute epidemic disease, characterised by profound disturbance of the central nervous system, indicated at the onset chiefly by shivering, intense headache or vertigo, or both, and persistent vomiting; subsequently by delirium, often violent, alternating with somnolence or a state of apathy or stupor; an acutely painful condition with spasm—sometimes tetanoid—of certain groups of muscles, especially the posterior muscles of the neck, occasioning retraction of the head, and an increased sensitiveness of the surface of the body. Throughout the disease there is marked depression of the vital powers; not infrequently collapse; and in its course an eruption of vesicles, petechial, r purpuric spots, or mottling of the skin, is apt to occur. If the disease tend o recovery, the symptoms gradually subside without any critical phenomena, nd convalescence is protracted; if to a fatal termination death is almost nvariably preceded by coma. After death the enveloping membranes of the brain and spinal cord are found in a morbid state, of which the most notable igns are engorgement of the blood vessels, usually excessive, and an effusion f sero-purulent matter into the meshes of the pia mater and beneath the arachnoid. The name 'Spotted Fever' given to this disease is a misnomer, as the spots are by no means constantly in evidence.

Useful "Remarks on Cerebro-Spinal Fever in **Camps and Barracks**" by Sir Wm. Osler, include the following. The disease spreads slowly or indeed not at all from foci of prevalence in various parts of a country. It has prevailed chiefly in the winter and spring months; an epidemic rarely lasts into the summer. It has a higher death rate than any acute infection except plague and cholera but the total mortality is not great as the case incidence in the community is low. It will kill within 24 hours—or less.

As a rule the organisms disappear from the naso-pharynx of healthy "carriers" in the course of a few weeks. The organism (meningococcus) is a germ of low virulence, widely spread in the community and of intense virulence in an individual once it has passed the portals of protection. Whether the organism gains access by direct invasion of the meninges from the naso-pharynx through the ethmoidal or sphenoidal routes or by the blood stream is a matter of discussion. The disease may be endeavouring to win a place among the great epidemics of the world. Soldiers are peculiarly liable (owing to exposure of bad weather and crowding in barracks, etc.). but in the great campaigns of the 19th century cerebro-spinal fever played no part as a camp disease. The incubation period may be as long as 30 days. The organism has never been isolated from dust, etc. Overcrowding must be prevented. Ventilation essential, all windows to be open day and night.

Blood-sucking insects are now known not to convey the disease.

In some cases septicæmia occurs. The meningococcus does not necessarily produce naso-pharyngeal catarrh but catarrhal conditions predispose to meningococcic infection.—C. Worster-Drought and A. Mills Kennedy.—L. ii./17,711.

Royal Society of Medicine (Section of Epidemiology and State Medicine) Debate:—

Various strains of the organism exist—to one of which the name para-meningococcus has been given. The *healthy* carriers seem to play the most important part in the spread of the disease. Discrimination between the meningococcus and the gonococcus a matter of some importance—gonococcic meningitis does occur, but rarely.

East African epidemics. The disease has assumed very virulent characters. In 1913 in one tribe it killed anything between 20,000 and 40,000. Description and division of the infection into five general types.—E. N. Butler, L. i./15,692.

Clinical features in children.—F. E. Batten, L./i.15,964.

Gordon and Murray carried out a systematic examination of a number of cerebro-spinal fluid meningococci and divided same into Four Groups. Types I. to IV. Types I. and II. are the main groups. P Fildes confirms their results.—L. i./18,92.

Inhibitory action of saliva (normal) on the meningococcus. The action is due to its content of living bacteria (streptococci). Hence avoid contamination with saliva in taking swabbings from naso-pharynx.—M. H. Gordon, B.M.J. i./16,849.

Age incidence. In the epidemic of 1914–1915 and 1915–1916 the most susceptible age was under 5 years—*i.e.*, during infancy and early childhood. There was a marked falling off of cases after adolescence was passed. The least susceptible age apparently was 35–40. It is a weather disease associated with the sudden saturation of the atmosphere with water vapour. The naso-pharyngeal mucous membrane is then more easily traversed by the meningococcus.—A. Crompton, L. ii./17,14

Lumleian Lectures. Epidemiology. Mode of spread of infection. Path of meningeal invasion. Clinical forms—a very exhaustive paper.—Sir H. Rolleston, B.M.J. i./19,406,536.

Meningo. Carriers. Study of.—D. Embleton and co-workers.—L. ii./10,679

Bacteriology and Diagnosis.—A diplococcus, evidently *Diplococcus intracellularis meningitidis* (Weichselbaum). has been isolated from the cerebro-spinal fluid and from the brain membrane. and the purulent exudate. It has been found in the nose in coryza and in rhinitic and otic discharges, and so it may be advantageous to resort to periodical ablutions of the nasal and buccal passages of the sick and their attendants. The organism resembles the gonococcus *M. catarrhalis*, *M. flavus*, etc. in morphology, in being intracellular, and in its non-staining by Gram's method. It requires special media for its cultivation and is recognised by its growth, sugar and agglutination reactions. It will not grow at a temperature below 25° C. and without precautions against drying it will die out even at 37° C.

The organism is grown on **Nasgar Medium** (*v. M. Gonorrhœa, Vol. II.*, or preferably on Gordon and Hine's **Trypagar**.

Gordon's Memorandum on cerebro-spinal meningitis to the L.G.B. **Characters of the *Meningococcus* detailed. *M. Catarrhalis* likely to be confused with it.**—L. i./07,598.

Still's Diplococcus. Still's organism is thought to be only a variation or attentuated form of Weichselbaum's Coccus.

"Chocolate" Medium made by heating 3 pts. of defibrinated bullock's blood with Trypsin Agar and 1% Glucose until it becomes a glossy opaque solid medium of chocolate colour. Results of cultivation of the meningococcus more successful than those with Serum—trypagar medium and others. H. W. Crowe, L. ii./17,201.

West's Swab for taking swabbings from the posterior wall of the pharynx consists of a wire in a bent glass tube and resembles Bellock's sound in glass instead of metal. These obviate the use of a tongue depresser. Inoculations are made *direct* onto Nasgar Medium and grown for 24 hours. Likely colonies can be cultivated on plates and incubated at 37° C. and at 23° C. Colonies growing at 37° C. and not at 23° C. and having the requisite appearance are taken as meningococci. (N.B.—Whatever medium is used cultures must always be prepared immediately).

The combination of either rash or vomiting, squint or rigidity of limbs, and opisthotonos, with a clinical picture otherwise resembling Influenza is very strongly suggestive of the graver disease—E. Hobhouse, B.M.J. i./15,419.

Diagnosis depends to a very great extent on realising there are three distinct stages of the infection, viz.—(1) Catarrhal, (2) Septicæmic, (3) Meningeal.—A. Lundie, D. J. Thomas, and S. Fleming.—B.M.J. i./15,466.

A swabbing from the throat in the first or catarrhal stage almost invariably shows presence of a streptococcus. The primary invasion of the mucous membrane is thought to be a streptococcus which prepares the way for the entrance of the more delicate meningococcus and should the meningococcus settle on a throat like this the way for further advance is facilitated. Subsequent stages are the septicæmic and the meningeal. Potassium Permanganate 1 in 1000 as spray in the catarrhal stage. Flexner's serum in the second and third. As much spinal fluid as will run out spontaneously—may be 100 Cc. is removed and a smaller quantity usually 30 Cc. of serum given. (The resultant must always be less than the original pressure).—A. Lundie, D. J. Thomas, S. Fleming and P.W. MacLagan.—B.M.J. i./15,836. See also L. ii./15,693.

Lymphocytic meningitis. Cases in which with acute symptoms are just like those of cerebro-spinal fever, the cerebro-spinal fluid though under high pressure contains no polymorphs and no meningococci but lymphocytes in excess. Never fatal.—W. P. Herringham, B.M.J. i./17,832.

Effect of culture media on agglutination of meningococci. Individual strains of meningococci when grown on nut Nasgar media become more agglutinable than when they are grown on legumen agar, with or without the addition of blood.—I. Walker Hall and G. E. Tilsley, L. ii./21,494.

Sugar (reducing Fehling's Solution) is absent in the acute stage, but may return in some degree as the infection recedes.

Treatment and Disinfection of Carriers.

Prophylactic in cerebro-spinal meningitis and influenza for treatment Tincture of Iodine mixed with an equal quantity of honey—two or three drops of the mixture on the tongue several times a day effectual.—J. A. Taylor, B.M.J. i./21,776.

Inhalation (? spray) composed of Iodine 12 Gm. Guaiacol 2 Gm., Thymol 0·5 Gm., Alcohol 200 Cc. with Potassium Iodide 6 Gm. used five or six times a day. Swab the throat out with a 3 to 5% solution of Iodine in Glycerin. Used in the French Army.—Sir Wm. Osler, B.M.J. i./15,189.

Antipyrin, Phenacetin and Opium are useful. Hydrotherapy in the form of the tub bath at 98° is recommended. All cases bear stimulants well. No drug seems to have any specific effect. Calomel and a counter-irritant in the form of Liquor Iodi or Liquor Epispasticus over the cervical spine gives some relief to the headache. Cardiac tonics advisable, Phenacetin and Caffeine if temperature unduly high. Chlorodyne gives great relief.

Soamin 5 grains intramuscularly on alternate days thought to be secreted in the cerebro-spinal fluid and to have deterrent effect, but it is not without danger.

Repeated lumbar puncture even in severe cases, with removal of from ½ to 1 ounce cerebro-spinal fluid together with injections of Saline. Excellent results—better than serum.—M. Foster.

Spraying with **Permanganate** (1 in 1000) is of some service.

Disinfect all articles likely to be contaminated with discharge with 5% Cresol.

Mercurome intravenously might be valuable.—W. H. M.

Tartar Emetic, ½ grain doses intravenously. Temperature normal in 60 hours.—S. Neave, L. i./16,1101.

Zinc Sulphate 1·2% as a steam spray or 1% Chloramine solution directly applied for treatment of 'carriers.'—M. H. Gordon and M. Flack.

Antimeningococcus Serum of the Lister Institute.

(*Special provisions apply in the manufacture of this Serum under the Therap. Subs. A (and Regns.* 1925, 1927.)

Dose.—30 Cc. (except when less than this amount of cerebro-spinal fluid can be removed), *intraspinally* by lumbar puncture (gravity method) at the earliest possible moment and repeated daily for at least 4 days. In children under 5 it is inadvisable to give more than 10 Cc. In severe fulminating cases the dose if possible should be 45 Cc. Patient should lie, after the injection, with head and shoulders low and pelvis raised. It is also used intravenously, *e.g.*, a *small* dose *intraspinally* and *massive* dose *intravenously*.—(Herrick 1918).

Sixteen cases by lumbar puncture. Vaccines 250 million subcutaneously at the time of first dose of serum. 2nd dose 500 million increased to 2000 million.—C. Worster-Drought, B.M.J. ii./16,689.

For the purpose of standardising antimeningococcic serum, endotoxin of the meningococcus extracted by a modified Besredka's method.—M. H. Gordon, B.M.J. i./18,110. *See* also *ibid.* ii./18,335.

Cerebro-spinal meningitis in Bombay. Treatment with intrathecal injections of Anti-meningococcic serum of the Lister Institute reduced period of illness, prevented the chronic lesions and types of infection, resulted in complete restoration of health in all but a small number of the recovered and greatly diminished fatalities.—P. T. Patel, L. ii./26,541.

Streptococcal meningitis successfully treated by intrathecal injection of anti-meningococcal serum.—C. W. Vining & H. P. Thompson, B.M.J. ii./24,667.

FR.CX. SUPP. 1920 states, the receptivity of animals being extremely variable, it is impossible to determine by tests, its therapeutic activity.

CONFERENCE ON STANDARDISATION. Great Britain, America, France, and Germany all adopt different methods at present. Further work to be carried out.—L. ii./22,1294.

P.G. VI. requires Meningococcic Serum to have a titre 1 : 100 in complement deviation test and in bacteriotropic tests, a titre of at least 1 : 1000.

Double, quadruple and eightfold strength is also prescribed.

Flexner's Serum. — Used intra-spinally, subcutaneously useless. Intra-spinal injection is made under chloroform. A rigid and comparatively large trocar is used. After puncture as much fluid as will do so is allowed to run out. If the amount of fluid is not great it can often be increased by raising the patient's head and shoulders.

Dosage.—If the case is very severe, and especially if pus is found in the fluid obtained by lumbar puncture, 30 Cc. or larger doses to be given every day for three days; (in one case 70 Cc. were injected within 20 hours after admission, with apparently good results). In cases not so urgent better not repeat the injection until after 48 hours. In this way only can the effect of the smaller dose be estimated, as the full effect of a single injection is not always apparent until after 48 hours, or longer. Sometimes a single injection of 30 Cc. is valuable. 210 Cc. have been given to a case intra-spinally.

Analysis of results. Lumbar puncture, drainage and intrathecal injection of polyvalent antimeningitis serum the most useful treatment. Lysol, etc. injections do harm.—A. Gardner Robb, B.M.J. i./17,478.

Intrathecal injections with the serum show the largest percentage of recoveries.—H. D. Rolleston, L. i./17,54.

Cerebro-spinal Fever Micrococcus Vaccine.

May be found of service in cases of acute cerebro-spinal fever, especially if a suitable anti-serum is not available. An initial dose of 50 millions may be repeated at intervals of two or three days, or increased at each rise of temperature. **Ampoules** contain 5, 10, 25, 50, 100, 250, 500 and 1000 millions.

Good results with anti-meningococcal vaccine in epidemic of cerebro-spinal meningitis.—per Jl. Trop. Med., July 15, '25,274.

For Cerebro-Spinal Fluid, Examination of, vide Vol. II.

Cholera.

The disease is marked by the presence of the *Spirillum choleræ.*

Anti-Cholera Vaccine. *Syn.* **Cholera Vibrio Vaccine.**—As an immunising agent only. A *dose* of 500 millions may be followed by constitutional disturbance, local redness, pain and swelling of the corresponding lymph glands, effects which should pass off within three days. A dose of 1000 millions should be given five or six days later and will probably produce less reaction. This dose should be repeated or doubled after a further 7–10 days. Full immunity is reached about a week later and persists for six months to a year.

Cholera and the Dardenelles. In the Balkan wars there were probably 30,000 deaths. The fate of the Turks after Lule Burgas teaches that in a few days unchecked cholera may inflict more loss than months of shell fire.

From December, 1914, to September, 1915, in Austria there were 27,591 cases and 15,270 deaths.—General V. Ziegler died of it—the only man who refused to be vaccinated.—B.M.J. ii./15,760.

Inoculation was compulsory in the Austrian Army after cholera broke out in the Serbian campaign. 1 Cc. of an emulsion of dead cholera bacilli was given subcutaneously and repeated 4 to 6 days later.—B.M.J. i./16,65.

Cholera inoculation was discussed at the German Medical Congress, Warsaw, 1916 (B.M.J. i./16,27). There was difference of opinion as to the probable duration of resultant immunity. For military purposes *double* inoculation (Cholera and Typhoid) was practised in urgent times—the cholera to be repeated in 6 months, the typhoid in 8.—B.M.J. i./16,192.

Treatment of Cholera in Calcutta.—L. ii./17,29.

Prevention and treatment by saline transfusion. See Normal Saline Solution, pp. 767, 768.

Castellani has inoculated against Cholera with his **Combined Tetra-, Penta-, and Hexavaccines,** *q.v.* p 949.

The prophylactic Vaccines of **Haffkine** have been used with success in India by employing a growth of the spirillum, the virulence of which has been increased by growth in the peritoneal cavity of guinea-pigs. They are:—

(1). Weak. (2). Strong. The dose of these preparations is 1 Cc. The second is injected 3 to 5 days after the first (the weak) one. They have to be freshly prepared.

Cholera vibrios may enter and live in the bile. Out of 271 fatal cases at Puri in 1912, the vibrio was cultivated from the bile in 80 cases. From the stools of 34,461 persons, travellers from cholera infected localities, vibrios were isolated in 63 instances, of which 23 agglutinated and 40 did not. Of the agglutinating vibrios all liquefied gelatin, gave the Pfeiffer reaction and were positive to the fixation test, several did not yield Indol and were non-virulent to pigeons, only two were non-hæmolytic. Of the non-agglutinating vibrios none gave the Pfeiffer reaction and only three gave a doubtful fixation; several were hæmolytic.—Review of Tropical Diseases.—Pr., Aug., '13,218.

A comprehensive report on recent advances in knowledge of cholera.—Lt.-Col. J. H. T. Walsh, T.D.B. 18/21,69.

Fish or shellfish origin of cholera in London in 1854. Need of regulating sale of small fish from shallow areas.—W. H. Hamer, L. ii./22,763.

A para-cholera vibrio isolated from several cases.—T. Kabeshima, T.D.B., Vol. 19, 1922/738.

'Appalling' death rate of cholera in Mesopotamia—40%. Probably a large percentage was bacillary dysentery. Dilute rice water instead of milk diet and Magnesium Sulphate, enough to get several motions, and on no account Opium. This procedure was effectual.—Lieut.-Col. Henry Smith, B.M.J. ii./22,1049.

House infection in cholera. Statistical Investigation found of value in India.—Lieut.-Col. A. G. McKendrick, B.M.J. ii./22,1266.

India may still be regarded as the home of cholera and Bengal as the endemic home, the evidence being that cholera in the rest of India is dependent on cholera in Bengal.—A. B. Fry, I.M.G., July '25,307.

The continued existence of cholera a disgrace to India. Every other civilised country of the world has freed itself of the cholera menace and if a determined effort were made in India the same result would be obtained.—I.M.G., Feb. '25,75.

Cholera epidemic in Russia. Encouraging figures under American Relief Administration.—L. ii./22,306,421.

Pilgrims and cholera. The religious Fairs and Festivals have a sinister influence.—L. ii./22,673.

During the first 6 months of 1922, 29,264 cases occurred in the three Soviet Republics of European Russia, 4,963 in Caucasia and 1,864 in Asiatic Russia. —B.M.J. i./23,971.

Precautions against cholera in Roumania. Isolation of persons from infected parts of Russia.—L. i./23,46.

Alkaline Starch Medium for isolating **Cholera Vibrio from faeces** in the case of Carriers.

The cholera organism alone of all the intestinal organisms acidifies starch (M. H. Gordon). Emulsify Powdered Agar 30 Gm. with cold water 250 Cc. Emulsify separately Peptone 10 Gm. and Sodium Bicarbonate 1·5 Gm. in a further 250 Cc. of water. Mix and add water 500 Cc. Dissolve in the steamer, clear with egg and filter. Emulsify Potato Starch 10 Gm. in some of the (cooled) medium and add to the rest. Sterilise by the fractional method. Add Litmus solution to make it blue. Cholera colonies acquire a faint pink more quickly (24 to 26 hours) than the allied vibrios.—H. Graeme Gibson, B.M.J. ii./16,454. For isolation from water see *Vol. II.*

It is stated that 11·8% Alcohol will kill the *Cholera vibrio* in 4 hours or less and that 7·8% will cause its disappearance in one day.—B. B. Brahmachari, per Jl. Trop. Med., Sept. 1/27,225.

For further references *vide* Previous Editions.

Cold Vaccine. *See* **Catarrh.**

Anti-Colon Bacillus Serum. *Dose.*—10 Cc. or more. Is prepared from horses which have been immunised against a number of types of *B. coli* principally from cases of peritonitis and puerperal fever. Supplied in 25 and 50 Cc. vials.

The action of this serum is chiefly bactericidal, though also possessed of **antitoxic properties**.

In acute *B. coli* infection of the kidney, Dudgeon has advised 25 Cc. of the Serum daily for three days, combined with Calcium Lactate to avoid rashes, joint pains, etc., better in his opinion than vaccines.

Investigations on *B. Coli* showed conclusively that these micro-organisms vary in each host; and that probably there are many species which exhibit the same microscopical and cultural appearances.

Colon Bacillus Vaccine is used in the treatment of post-surgical suppuration in abdominal cases, such as sinuses which refuse to heal after operations upon the appendix, gall bladder, kidney, or intestines; also in bacilluria complicating tubercular cystitis, in the nephritis of pregnancy, and in endometritis, when due to infection by *B. Coli.* Initial doses of 5 million organisms may be repeated at intervals of 7–10 days, and may be gradually increased till 100 millions or more are being given. If the doses employed cause any sturbance of the general conditions as evidenced by rigors or rise temperature this must be taken as indication either of pus under ressure or if not this, for diminished subsequent dosage.

Discharging sinuses should, if possible, be kept open, as closing is kely to result in rigors and severe constitutional disturbance.

Immunisation of the patient 3 to 4 days prior to abdominal operaons in cases where the presence of pus is suspected is to be advoated—for this purpose a dose of 500 millions may be employed.

In cases of bacilluria the urine should be kept well alkalinised by ll doses of Sodium Citrate or Sodium Bicarbonate.

Ampoules contain respectively 10, 25, 50, 100, 250, 500 and 1,000 illion organisms.

Vaccine treatment of *B. Coli* infections of the urinary tract is ommonly practised with generally favourable results.

Appendicitis 22 cases with anti-colon B. Serum 20 Cc. dose and vaccine 0 million a few days later.—A. Cowan Guthrie, B.M.J. i./15,67.

Arthritis treated by B. Coli Vaccine intravenously—" non-specific therapy." Miller and Lusk, Jl. Am. Med. Assn., Jan. '16,1756. see also B.M.J. i./18,196

Rheumatoid arthritis treated by Bacillus Coli Vaccine *intravenously*, to 200 millions for first dose, with patient in hospital. Rise in temperature ew hours after injection (100 or 103° F.). Subsequently up to 500 million more given. The method thought, at least, to be an adjuvant to more cognised methods.—R. J. Perkins and C. B. White, B.M.J. i./23,411.

Hay fever treated by Autogenous *B. Coli* Vaccine, *see* **Hay Fever.**

iphtheria Antitoxin, Serum Antidiphthericum, P.G. VI., U.S., &c (*Special provisions regarding the manufacture of this Antitoxin e made under the Therap. Subs. Act* 1925 *and Regns.* 1927.

The Antitoxin combats the disease in the human subject.

It retains its activity for 10 months if kept in a cool and dark place.

The loss in unitage may be about 10% *p.a.* in indifferent storage conditions A. T. McConkey, B.M.J. i./17,10.

Dose.*—Diphtheria antitoxin should be stocked in phials containing* 000 *units for treatment and* 500 *units for prophylaxis ; the former hould be concentrated serum containing the* 8,000 *units in less than*) *Cc. A curative dose can then be given in one injection with a* 10 *c. syringe. In the case of a prophylactic dose the* 500 *units should ot be contained in less than* 2 *Cc. It is seldom safe to rely on any dose less than* 8,000 *units, whatever the age of the patient may be : larger itial doses—e.g., from* 16,000 *to* 30,000 *units—are specially required hen the administration of antitoxin has been delayed until the third fourth day from the onset of the attack.—Ministry of Health Memorndum* 1922. *The immunity caused is claimed to last for* 3 *weeks. he antitoxin may be warmed by standing in water at* 40° *C. for* 10 *inutes before injection. Avoid injecting air. Give the dose at once ithout waiting bacteriological diagnosis. Use a sterile glass syringe ith small needle. Cleanse skin with ether soap and inject in the flank between the scapulæ.*

In one sense, too much cannot be given; one cannot poison a person ith it by an over-dose as with Morphine or Strychnine.

ite of Injection :

Intramuscular injection is not so rapid in effect as intravenous e, but is quicker than subcutaneous, and in general is advised.

By injecting *intravenously* the toxin circulating in the blood is more effectually and rapidly neutralised, but intravenous injection is not easy in all cases.

The antitoxin is sometimes given *per anum* and *per os*, but opinion is, in general, against its administration by these channels.

Oral administration of Diphtheria Antitoxin in a case is to throw away a valuable remedy upon the correct administration of which life may depend. Guinea pig experimental proof.—L. Cobbett and W. Henwood Harvey, B.M.J. ii./22,1265.

The **number of immunising units** contained per Cc. varies in the different pharmacopœias and with different manufacturers.

Antitoxin units discussed at Conference on Standardisation (Paris). The **Erhlich Standard Unit** should be considered as the international standard. —L. ii./22,1294.

Standardisation of Sera and biological products. System of checking national units of antidiphtheria serum by the international unit (supplied from the Copenhagen Institute) is working well. American, British and German units tested and found identical. Proposed unit for Tetanus antitoxin half the existing American unit. Further investigations proceeding with dysentery, pneumococcus, anthrax, Malta fever and other sera.—Health Committee, League of Nations, L. i./24,720.

U.S. X. has **Antitoxinum Diphthericum.** *Syn.* SERUM DIPHTHERICUM PURIFICATUM, CONCENTRATED DIPHTHERIA ANTITOXIN (U.S. IX.), with potency of not less than 350 Antitoxic units per Cc., and *Average Dose*, Curative 10,000 units: Protective 1,000 units. A solution of the Antitoxin-bearing globulins, containing Sodium Chloride and preserved with not more than 0.5% Phenol or 0.4% Cresol. This purification by the removal of the unrequired serum albumen may reduce the untoward serum rashes which frequently occur with ordinary Antitoxin.

P. JAP. IV. Liquid Serum is 500 Ehrlich units in 1 Cc.

In addition to the liquid sera, **Dried Serum** (U.S. IX., F.E., P.G. VI., P. Jap. IV.) in amber coloured scales is manufactured by evaporation at a temperature not exceeding 40° C., or by means of Sulphuric Acid *in vacuo.* This is more suitable for export. The scales are dissolved in sterilised water. It is not soluble in hot water (above 50° C.), nor in alcohol. The directions given by each maker should be followed.

As higher potencies are now used than formerly, and the quantity of serum injected is therefore less, rashes, pain and swelling which sometimes result, are less frequent. Calcium lactate is said to relieve the rash, pain, &c.

For brief extracts from the (earlier) literature on this Antitoxin and notes on the **Schick Test, Serum Rashes, Untoward Results and Diphtheria Carriers, Diphtheria Endotoxin and Toxin-Antitoxin,** see *Vol. II.*

Large initial doses of antitoxin given as early as possible are successful in diphtheria.—R. Davison, B.M.J. ii./21,918.

The child requires as large a dose of Antitoxin as the adult. Intramuscular injection best, deeply into the vastus externus, not the gluteal region. Not less than 6,000 units. Importance of the recumbent position in bed in treatment—not even a pillow should be allowed for a minimum of 3 weeks.—F. H. Thomson, L. ii./21,69.

Value of Diphtheria Antitoxin limited to first three or four days of the disease. Early diagnosis and treatment essential. All suspicious cases should be injected at first sight.—D. MacIntyre, L. i./26,855.

Intravenous injection of Diphtheria Antitoxin. Give it slowly. It ould be the method of choice.—Poul Iversen, L. i./23,694.

DIPHTHERIA PROPHYLACTIC (TOXIN-ANTITOXIN MIXTURE—*see also Vol. II.*). Cc. doses have been used in America and elsewhere with excellent results.

Manganese Chloride is able to raise the Antitoxin titre of horses immunized Diphtheria Toxin, but has no effect on those immunized with Tetanus xin.—B.M.J.E. i./25,10. Manganese—effect on agglutinins.—B.M.J. 25,1129.

The tooth brush as a carrier of virulent diphtheria bacilli. Immersion 1 minute in a 5% solution or for 5 minutes in a 2% freshly prepared solution standard Lysol found insufficient to kill B. diphtheriæ on artificially infected oth brushes.—G. H. Culverwell and J. Graham Forbes, L. ii./23,255.

Ichthyol Ointment 10% applied to nasal mucosa of carriers. A negative lture is usually obtained after 5 consecutive days' use.—per Pres., June, ,247.

Intraperitoneal injection of diphtheria antitoxin—particularly vocated in advanced cases in which the intravenous method cannot be ployed.—L. ii.23,994. It gives better results than intravenous or intrascular.—Am. Jl. Dis. Child., Feb. '25,214, per Pres., Jan. '26,15. In toxic yocarditis.—B.M.J.E. i./25,80.

PUERPERAL SEPSIS well treated with antidiphtheria serum ***orally*** in ses of 30–100 Cc. daily, 10 Cc. being given at a dose, and the strength being 0 units per Cc. Successfully used for over a quarter of a century.—D. M. ton (Melbourne), B.M.J. ii./24,1139.

Diphtheria Bacillus Vaccine has been advocated as an adjuvant antitoxin in cases where the *B. Diphtheriæ* tends to persist in the roat after convalescence. The initial dose of 25 millions may be peated in 7 or 8 days; subsequent administrations up to 500 illions are to be controlled by bacteriological examinations of the fected parts. **Ampoules** contain 10, 25, 50 and 100 millions.

An autogenous Vaccine seems to be of definite value in removing membrane, tting rid of nasal discharge, and hence greatly reducing the infectivity of embranous rhinitis, but Vaccine does not appear to be capable of completing e work of elimination after the membrane has gone.—L. i./12,294.

The action of *Radium Rays* on Diphtheria Toxin has been discussed. See adium *Vol. II*.

ysentery.

The Lister Institute supplies **anti-dysentery serum** consisting of the rum of horses which have been immunised against the dysentery bacillus higa, Flexner, etc., types). Supplied in 20 Cc. vials.

(*Special provisions regarding manufacture of this Serum are in the Therap. ubs. Regns.* 1927.)

Dose.—Preventive 20 Cc. subcutaneously: curative an initial dose of –60 Cc. intramuscularly on the outer side of the thigh (into the body of the *stus externus*), repeated daily till improvement sets in. For a grave case, –100 Cc., repeated daily if necessary. Some dilute 60–80 Cc. with 150–300 . Normal Saline and give *intravenously* (Graham's experience in the war). any case, give it early. Stools are stated to return to normal rapidly in ccessful cases, but treatment to be continued. Pains and temporary rashes ay result, which need, however, not alarm.

It is stated that while much of the endemic dysentery prevailing in tropical d sub-tropical countries is caused by pathogenic amœbæ, epidemic dysentery e to *B. dysenteriæ* occurs all over the world, and this bacillus is also found asylum or institutional dysentery, in some sporadic cases of ulcerative litis and in certain forms of summer diarrhœa.

Keeping Properties. This serum appears to retain its 'toxin'-utralising power for at least 1½ years, the dry powdered Shiga B. being ed as test toxin.—A. T. McConkey, B.M.J. i./17,11.

SERUM ANTIDYSENTÉRIQUE FR. CX. SUPP. 1920, is obtained from horses munised with B. dysenteriæ (Shiga). Exact tests for its antitoxic power provided.

Dysentery Serum. CONFERENCE ON STANDARDISATION (PARIS). Outline further work on toxins.—L. ii./22,1294.

Fulminating cases received large doses assisted by Magnesium Sulphate 1 drachm three times daily for the first few days. In bad cases Morphine needed and for very severe tenesmus a suppository containing Cocaine ½ grain and Iodoform 3 grains is useful. Rectal lavage with 1 in 1000 Copper Sulphate and Mist. Simarubæ often benefits chronic cases. Generally there is distinct rise in temperature within 12 hours of injection which may last 48 or 72 hours. Good prognostic sign.—J. B. Fisher, B.M.J. i./17,43. *See also* G. A. Finlayson, B.M.J. i./17,46.

Bacillary dysentery in the Royal Naval Division.—Surg.-Gen. H. D. Rolleston, B.M.J. i./17,258. *See also ibid.* ii./17,539.

In the ***Salonica Forces,*** dysentery was hardly less in importance than malaria. No figures are available to show the relative frequency of the amœbic and bacillary forms. The *latter* was the dominant form, and though amœbic cases were present throughout, it was only late in the season of 1917 that the extent to which this form (the amœbic) prevailed came to be recognised. Evidence of a widespread amœbic infection in its most insidious form, carried about by apparently healthy people, finally accumulated.

The opinion expressed early in the same year by Lieut.-Col. Graham (L. i./18,51) that less than 3% was of amœbic type had therefore to be reconsidered in light of later knowledge.—Col. A. G. Phear, Proc. Roy. Soc. Med., Vol. XIII., 1920, pp. 57–100.

Serum Treatment of Bacillary Dysentery.—B. G. Klein, L. ii./19,775; W. E. Waller, *ibid.* 778.

Bacillary Dysentery.—Med. Res. Com. Report on—reviewed, B.M.J. ii./19, 283

Vaccine B. Dysenteriæ. *Syn.* **Anti-dysentery Vaccine** (*Therap. Subs. Act proper name*).

Dose for prophylaxis 250, 500, 1000 mill. at intervals of 7 to 10 days. Initial dose for treatment 5–10 millions.

For immunisation and treatment, practically atoxic; supplied in ampoules 50, 100, 250, 500 and 1,000 millions.

Directions for preparation of Dysentery Vaccine including experiments demonstrating that the toxicity of an emulsion of B. Dysenteriæ can be reduced or entirely destroyed by dilute hypochlorous acid (1 in 1000 dilution of Eusol) or Hydrogen Peroxide and that the injection of an emulsion of this kind in which the toxin has been destroyed produces a satisfactory degree of immunity.—H. R. Dean and R. S. Adamson, B.M.J. i./16,611.

For details concerning differential diagnosis of Bacillary and Amœbic Dysentery and other Bacteriological data see Vol. II.

Endemic Goitre in certain parts of India, is held by McCarrison to be due to intestinal intoxication. He has followed this up by treating patients with Vaccines prepared from mixed cultures of all the coliform organisms grown from the fæces. Initial dose of 150 millions increased at intervals of one or two weeks to 350 or 500 millions. From four to seven injections being required in most cases. Needs of the body in Iodine, greater in presence of pollution of food and drink than in its absence. Perfect cleanliness is as effective as provision of additional supply of Iodine in food. Gastro intestinal infection favours goitre. Intestinal antiseptics should be curative. Perfect hygiene of the bowel essential. At the Roy. Mil. Asylum, Sanawar, India, goitre incidence of 23% reduced to 2% simply by installation of good water supply. It contained *no* Iodine. Where goitre arises despite these measures, Iodine intake assumed insufficient.—R. McCarrison, B.M.J. i./24,989. See also our pp. 714, 775 and Therap. Index.

Gonorrhœa.

(*See also* Venereal Diseases Act, 1917, and Therapeutic Index.)

Gonococcus Vaccine. Ampoules contain 10, 25, 50, 100, 250, 500 and 1,000 million Cocci respectively

In preparing the Vaccine, cultures are taken from cases suffering from a severe first attack, which has been untreated by antiseptics.

Dose.—In acute urethritis and such complications as prostatitis, vesiculitis, epididymitis, the initial dose is 5 millions, and by judicious use of the vaccine duration and severity of the disease may be materially shortened. In junctivitis and iritis (initial doses 250 millions) and arthritis (initial dose millions) it is stated to be specific. The diagnostic dose in cases of arthritis loubtful origin is 500 millions (*vide* Streptococcus Rheumaticus vaccine).

series of injections will certainly free any case of chronic gleet from the ococcal infection, although it may not succeed in stopping discharge irely in all cases owing to secondary infections.

nitial doses may be repeated at intervals of 7 days, and gradually increased il a maximum dose of 500 million organisms has been attained. Some es receive benefit from the injection into the urethra night and morning an ounce of a liquid culture of Lactic Acid Bacilli.

he injection of gonococcal vaccine usually gives rise to a reaction, which y be local or general. The *local reaction* consists in redness and swelling he site of injection. The *general reaction* is manifested by a rise of temature accompanied by increased pain and tenderness in the affected joints the case of gonorrhœal arthritis). Both reactions usually subside within nty-four hours. The reactions are said to be less marked after small n large doses, and to be absent in cases free from gonorrhœa.

n the acute stages of gonorrhœa and cases of uncomplicated chronic thritis, provided the disease is localised to the urethra, vaccine treatment inavailing. Gleet resists ordinary treatment because the prostate is the t of mischief; if this gland is massaged every other day for a minute or so inserting a finger per rectum all the secretion is squeezed out, consequently n injection of Silver Nitrate 1 per cent. or Copper Sulphate 5 per cent. now given, the prostate absorbs the solution, and a gleet which has persisted months or years may not infrequently be cured in a fortnight.

onorrhœal prostatis and vesiculitis. Vaccines of value in some classes.— Cambell, B.M.J. ii./23,456.

etastatic gonorrhœa. Opening remarks in Discussion before the Soc. for dy of Venereal Diseases. Question as to use of Broughton Alcock's method using live gonococci intravenously.—Sir T .Horder, L. i./23,1304.

utogenous Vaccine **of great value.—Sir W. Willcox, L. i./23,1314.**

togenous vaccines of higher value than stock vaccines. It does not matter small a dose is given at first, it can easily be increased rapidly until there signs that the vaccine is taking effect. In gonorrhœal rheumatism care uld be taken not to increase the dose by too large an amount daily—the ular emptying of the prostatic focus, and massage every 5 days, the best n of treatment.—Maj. A. T. Frost, L. i./23,1314.

imultaneous injections of autogenous vaccine (6,000 million bacteria per with protein of value in gonorrhœa. Initial dose of vaccine 0·2 Cc., reased by 0·1 Cc. to 1 Cc.—A. Tansard, Presse Med., Sept. 19, '25, per Jl. I.A. ii./25,1433.

on-specific Protein (Milk) Injections in gonorrhœa—see p. 676.

y Fever.—

Hay fever is caused by a soluble toxin which is innocuous to normal ividuals. In hay fever patients the occurrence of some of the ctions associated with the production of immunity,—precipitan of pollen extracts by the patient's serum and complement iation during the season has been shown. Pollen toxin is capable giving rise to the production of antibodies. Spontaneous cures ur, *i.e.*, by active immunity production, but more usually patients elop a condition of hypersensibility, each successive season. periments to determine what degree of immunity can be induced by culation of Pollen Toxin were undertaken at St. Mary's Hospital.

he inoculations were made in the autumn, winter and summer, and it found possible to raise the patient's resistance to doses of the toxin. An ract was prepared of the pollen of grass by Dunbar's method of extraction distilled water, aided by freezing and thawing several times. These racts are boiled for ten minutes after sealing in glass tubes. This treatment not decrease their activity. Very dilute extracts of the pollen of *Phleum tense, Poa Trivialis, Holcus Lanatus*, and *Agropyrum Caninum*, gave the e reaction when dropped into the eyes of hay fever patients, whilst non-sufferers gave no reaction. A unit of Pollen Toxin was arranged (normal individuals had a resistance 20,000 compared with a sensitive patient 4) and the state of the patient's malady is thus known, and dosage can be calculated. Patients receive subcutaneous injections of, at first, very minute doses of Pollen Extract, at intervals of three or four days, then of a week or so. The sensibility of hay fever patients may be decreased by proper dosage at least a hundredfold, while excessive, or too frequent dosage only tends to increase sensibility.—L. i./11,1572.

Initial dose.—A man giving a diagnostic reaction of 6 U.P. would receive 2 U.P. hypodermically, and one who reacted to 100 U.P. would receive 33 U.P.

Subsequent dose.—About every week or ten days—large doses less often, small ones more frequently. The dose should be selected that will give the greatest increase in immunity as measured by the ophthalmo test—within limits. *The second and third doses may be half as much again* as the first, while the fourth, fifth and sixth may perhaps be twice as much as the first.—L. ii./11,814 and i./14,1178.

Phleum Pratense, pollen extract, is stated to confer immunity against other pollens and conversely.

The pollen of *Anthoxanthum odoratum* (Sweet Vernal Grass), which flowers in May, is responsible for the onset of hay fever and not that of Timothy grass, which does not come into flower until many weeks after the beginning of the hay fever season.—F. G. Chandler, L. ii./26,490.

190 possible hay fever pollens in California.—L. ii./22,679.

A Hay Fever Reaction Outfit is supplied for determining (*a*) whether a patient is susceptible to pollen toxin, (*b*) the degree of such susceptibility, (*c*) the dosage of pollen vaccine suited to any case.

Hay Fever Vaccine. Ampoules contain 50, 100, 500 and 1,000 'units.' Immunisation should be commenced in susceptible persons during February with an initial dose of 25 units :—subsequent doses as above with 7 to 10 days' interval. In treatment the initial dose may be determined by the ophthalmic reaction or failing this give 50 units initially.

HYPERSENSITIVENESS IN HAY FEVER, URTICARIA AND ASTHMA.—Hay fever forms a good example of hypersensitiveness. The attack, instead of conferring immunity, renders the subject still more susceptible to the disease. For a number of years a person may suffer from a series of coryzas to which he does not attach much importance, then one day, when placed in an atmosphere of toxic dust, he suddenly finds himself in the throes of an asthmatic seizure. All people who suffer from hay fever are thought to be victims of hypersensitiveness. They have begun with hay coryza and progressed to hay asthma from a special hypersensitiveness to pollen and vegetable dusts.

Three conditions are thought essential for the production of hay coryza—

1. The existence of a nervous temperament, hereditary or acquired. 2. A hyperexcitability of the nasal mucosa. 3. An external irritant.

Hypersensitiveness, hereditary or acquired, also explains a whole series of conditions, viz., those included under the term "arthritism." Urticaria, also, is to be regarded as a sign of hypersensitiveness—there is scarcely a neuro-arthritic who has not, at some time in his life, had an attack, the causative irritant varying with the individual. Since antipyrin not infrequently causes urticaria in susceptible persons, Billard has employed this drug as a test of neuroarthritism, and finds that by administering it he can produce an urticaria in a large number of asthmatic patients. Moreover, urticaria may lead to asthma, just as hay fever leads to hay asthma. Hay coryza may indeed be regarded as an urticaria of the conjunctiva, and of the mucous membrane of the upper respiratory tract.—*Gazette des Hopitaux*, 2nd June, 1910, per Glasgow Med. Jl., Nov., 1910.

B. Coli associated with hay fever. A case of regular recurrence greatly benefited by Autogenous Vaccine of the *B. Coli* isolated from the pus obtained by washing out the antrum together with Calcium Lactate in large dose.—L. ii./12,1012.

imilar result may be obtained with organisms isolated from antrum, etc.

lterations in the blood during Hay fever.—E. Emrys-Roberts, B M.J. 4,1176.

'uberculin subcutaneously has been found to relieve hay fever, *cf.* p. 907.

For a consideration of Cutaneous Tests, Reactions from, and Non-ecific Protein Therapy in asthma, hay fever and numerous allied ections, see p. 664 et seq.

luenza Bacillus Vaccine.

Of service in respiratory disorders due to this organism, but the ganism only occasionally occurs alone; frequently it is accom-nied by the *Pneumococcus, Streptococcus, M. Catarrhalis,* or Bacillus of the whooping cough. Many cases of so-called nfluenza' are due to the *Pneumococcus, Streptococcus* and *M. tarrhalis* either separately or together and in these the **Combined ccine for Colds**, p. 908, is used. In influenzal septicæmia or docarditis the initial *dose* is 10-25 millions, in true acute influenza 0-250 millions. Chronic influenza, especially if complicated by usitis or antral trouble, may persist for years if untreated, and ge doses of vaccine, 1,000 millions or more, may be needed for its re. **Ampoules** containing 10, 25, 50, 100, 250, 500 and 1,000 llions are prepared.

As a prophylactic and therapeutic agent it has been largely used. ere is no danger in giving it during an epidemic of influenza, t those already acutely infected should receive smaller doses, ., $\frac{1}{5}$ or $\frac{1}{20}$ the normal. For prophylaxis begin with 100 millions. d follow in 7 days with 250 millions and increase up to 1,000 illions.

The presence of an organism conforming in every particular to eiffer's Bacillus* does not necessarily indicate that there has been influenzal infection. Each strain of the bacillus may possess ferent pathogenic powers—in this way somewhat similar to the cilli of the colon group.

Some pathological aspects of influenzal pneumonia.—Sir Thomas Oliver t. Conf. Trop. Am., '24,821. M. J. Rosenau considers Pfeiffer's bacillus arly a secondary invader.—*ibid.*, 831.

ar Office Conference Vaccine was revised to the following formula :—

B. Influenzæ	400 millions	in 1 Cc.
Streptococci	80 ,,	
Pneumococci	200 ,,	

It originally contained 60 millions of *B. Influenzæ.*

With the increase in proportion of the first mentioned, the vaccine may ove a powerful reinforcement to measures of protection. Dose ½ Cc. with further 1 Cc. after 10 days' interval. Table of results over wide area.—r W. B. Leishman, L. 1./20,366.

Pfeiffer's organism causal of influenza in certain troops but not in others. -J. W. Edington, L. ii./20,340.

The following were the conclusions of the Conference on Vaccine therapy Influenza.

Pfeiffer's Bacillus plays a most important part in the production of the mptoms and complications of the disease but the existence of some as yet discovered virus may be regarded as possible. Pneumococci and Strep-cocci are chiefly responsible for the gravity of the secondary pulmonary mplications. The vaccine to be polyvalent and made from organisms lated in the current epidemic to be sterilised at 55° C. for ½ hour and contain 5% phenol.

Preferable to inoculate men before exposure to infection, but no harm in treating a body of men among whom influenza had already broken out but individuals not to be inoculated who already had fever or at the time suffering from catarrh. Further advice was :—

(a) *Children.* Not advisable to inoculate children under 3 *years of age.*
From 3 to 7 years—¼ of the full doses.
From 7 to 10 years—½ of the full doses.
Above 16 years—full dose.

For treatment of severe cases and complications :—

(a) The vaccine is most likely to be of use in subacute and chronic cases. Here the initial dose should be 1/5 the first dose above.

(b) For severe cases of secondary broncho-pneumonia the vaccine is not advised but if it is desired to try it give 1/20 the first dose.—B.M.J. ii./18,470,494 L. ii./18,565.

W. H. Wynn points out that 1000 million B. Influenzæ may confer immunity lasting several months, while that from 30 probably lasts but a few days. He employs 100 million each pneumococci and staphylococci and 50 million B. influenzæ, and after seven days double the amount—for prophylaxis. For *treatment* 50 million each pneumococci and streptococci and 30 million B. Influenzæ as soon after onset as possible. For broncho-pneumonia the same dose, repeating or even increasing every other day or sometimes daily. 1½ million as advised by the Conference cannot be adequate.—L. ii./18,642,874. See also Pr., Feb. 1919 and B.M.J. i./20,254.

Pfeiffer's bacillus is the agent which so markedly lowers the general resistance of the bronchial passages and may thus be the real cause of the disease—there is a possibility, however, that the presence of an ultra-microscopic organism underlies all the phenomena.—R. Muir and G. Haswell Wilson, B.M.J. i./19,3.

Stock vaccine should be potent. If the cultivation medium does not contain a substance—*e.g.*, fresh human blood—to induce the microbes to produce their specific toxins they lose to a great extent their antigenic efficiency. Further, there is no need to kill by heat—use 0·5% Phenol Saline.—W. M. Crofton, B.M.J. i./19,240.

Influenza and Pneumonia; prophylactic inoculation by N.Z.E.F. Mixed Catarrhal Vaccine. *Dose* 1. B. Influenza 500 million, Pneumococci and S. hæmolyticus each 250 million. *Dose* 2. Double in each case. Interval 7 to 10 days. No cases of either influenza or pneumonia.—F. L. Armitage, B.M.J. i./19,272.

True pandemic and epidemic influenza is always caused by Pfeiffer's bacillus. This is not generally accepted because it is not realised that this bacillus requires special precautions for its isolation. It will die usually if allowed to get cold, and it will not grow on ordinary culture media. Also when first grown, especially if the medium is not ideal, it looks like minute cocci and may be passed over as *M. catarrhalis.* The only certain treatment for influenza is inoculation with a potent antigen of the prevailing strain.

Preparation of the Antigen: The medium used consists of Agar (9 Cc.) cooled to 50° and mixed with unheated fresh human blood (1 Cc.). It must be inoculated warm, directly from the throat or from sputum kept at body temperature. In a moist atmosphere the microbe grows in well-marked greyish colonies. Some of the culture removed with a platinum loop and suspended in 0·5% phenol-normal saline can be used as antigen 15–20 hours after taking the material. This antigen is most potent, one million being sufficient for the first dose.—W. M. Crofton, Pres., Apl. '27,133.

Major Michael Foster found evidence of utility of preventive inoculation extremely slender. Major Tytler found Pfeiffer's B. in 93% of cases working at Boulogne.—B.M.J. i./19,488.

In India in October '18, influenza caused havoc to which the Black Death of 1348-9 alone affords parallel—not fewer than 4,899,000 persons (about 2% of the whole population) died of influenza or its complications in British India, the vast majority within 2 months. Indians have a low resistance to pneumonic infection.—Major Norman White, Sanitary Commissioner with the Government of India, B.M.J. i./19,417.

Preventive Vaccines in U.S.A. employing Influenza 5 *billions*, Pneumococc- Types I. and II. each 3 billions, Type IV., 1 billion, S. Haemolyticus 100 millions.—L. i./19,707.

Aetiology of Influenza.—G. E. Beaumont, L. ii./19,231.

The *radius of infection* is very small—at three or four yards from the patient there is little risk.—Pres., Apl. '19.

Protection against influenza seems to be conferred by taking Quinine and rsenic as in case of malaria patients.—Pres., Apl., 19, p. 78.

Epidemiology. Pfeiffer's bacillus played a part of vast importance; ext came types of Streptococci. *S. hæmolyticus* often found in pulmonary sions.—Ministry of Health Report, B.M.J. i./21,348.

Intimate association of Pfeiffer's bacillus with influenza. Its toxin is ıpable of re-producing experimentally the chief lesions found post mortem of ıe disease. Attempts to produce influenza experimentally in monkeys, ıbbits and guinea-pigs with both filtered and unfiltered influenzal material ere, practically speaking, negative. Strongly opposed to the idea of the rganism responsible being a filter passer.—Prof. J. McIntosh, B.M.J. ii./22,137.

The Americans concluded that the etiology and portal of entry of the excitıg cause of influenza (in U.S.A.) are both unknown. The organisms associated ith influenzal pneumonia are the so-called mouth organisms present in the ıouths and upper air passages of normal individuals as well as of influenza atients.—B.M.J. ii./21,1124.

A type of streptococcus isolated from nasal mucus and blood. In broth ılture it is a small streptococcus occurring in fairly long chains and on solid ıedia is extremely pleomorphic, showing large ovoid forms and pointed ends: roduces strong bleaching on boiled blood agar. Is it the causal organism?—. Thomson and R. Thomson, L. i./27,252; *ibid.* 1126. Prior claim to disovery of organism in 1919.—R. Donaldson L. i./27,365.

Pneumonia and Influenza—Ministry of Health Report. Types of neumococci, distribution and serological characters of influenza bacilli, as ound in 1918-21. Influenza bacilli were recovered from the normal nasopharynx in over 30% of persons examined, in about 60% of cases of lobar neumonia, in 88% of cases of simple broncho-pneumonia and bronchitis, nd, during the epidemic of January, 1922, in 65% of cases of influenza and ıfluenzal pneumonia.—B.M.J. ii./22,388.

The influenza epidemic in the early part of 1923 had no predominating rganism. Different cases varied widely in the flora, and apparently the ıajority were, in effect, suffering from the filter-passing virus, which was ıe basal infective agent, and less from the secondary infections, such as neumococci streptococci, m. catarrhalis, etc.

"Local" prophylactic vaccines embodying the usual series of organisms ıccessful in restricting influenza epidemics in Rugby school.—A. I. Simey nd J. W. H. Eyre, B.M.J. i./22,433.

Vaccination with strains of Pfeiffer's bacillus gave good results in preventing ıfluenza at Christ's Hospital School.—G. E. Friend, B.M.J. ii./25,902, and at onbridge, G. L. Bunting, *ibid.*

Memorandum by Min. of Health. A useful resumé of present knowledge f ætiology, prophylaxis and treatment.—L. i./27,248.

Filter-passing viruses. The ultramicroscopic particles of bacteria when ained red by Giemsa's stain do not contain chromatin, and hence cannot e regarded as living organisms. H. M. Woodcock thinks a pathological nzyme may be adsorbed on to the granules, so that though these granules re not the actual virus, they may indicate its presence. Some would still ook on influenza as being caused by an ultramicroscopic virus.—B.M.J. ./22,885.

Filtrable Virus as the cause of early stage of Influenza epidemic, confirmıg the findings of Nicoll and Lebailly. Experiments on monkeys.—H. raeme Gibson and co-workers, B.M.J. ii./18,645.

Complete failure to confirm observations of Olitsky and Gates as to presence f *B. pneumosintes* in nasopharynx of patients in early stages of influenza, ıough carefully following their technique.—G. S. Wilson, L. i./27,1124.

CANINE DISTEMPER. Causative organism not isolated, but probably due o a filtrable virus analogous to that of equine influenza, swine fever and owl plague. The *B. bronchisepticus* (Ferry) and various strains of staphyococcus and streptococcus are found.—L. ii./21,1038.

Detoxicated Influenza Vaccine. (Thomson). Used with promising esults both prophylactically and as a cure.—D. Lees, L. i./19,1107. For a eneral description of Detoxicated Vaccines see p. 901.

For further information on B. Influenzæ, vide Vol. II.

Ozæna Bacillus Vaccine.—*Initial dose* 50 to 100 millions, increased to 50, 500, 1,000 and 2,000 millions if necessary with seven day intervals.

B. Ozænœ is found in cases of early atrophic rhinitis and autogenous Vaccines of it combined with other organisms present, *e.g.*, *Streptococcus*, *Pneumococcus*, *Staphylococcus Aureus* and *M. Catarrhalis* have been given.—Abel, Page and others.

Pneumonia.

Sources of the Pneumococcus and Modes of Infection.—Pneumonia is rarely caused by auto-infection from the germ so commonly present in the throat in health, but is usually due to infection with pneumococci present in the air, dust, etc.

The specific antigenic substance from the pneumococcus is said to be a complex carbohydrate.—M.R.C. Rept., 1924-5.

Pneumococcus Vaccine (WIMPOLE INST.). **Ampoules** for Hypodermic use contain 25, 50, 100, 250, 500 and 1,000 million organisms.

This Vaccine, besides being of service in pneumonia (it should be given early), is also used in empyema, especially in children (in adults, combination with a streptococcal vaccine may be advisable), in nasal and laryngeal catarrh, asthma and bronchitis, periostitis, otitis, endometritis, and pyosalpinx, where initial doses of 100 millions may be employed, when due to this organism.

Dose.—10 millions initially is repeated or increased at intervals of seven days, according to clinical symptoms. Cases of delayed resolution in pneumonia are benefited by injections of 50 to 100 millions every 8–10 days, while routine treatment of all cases of pneumonia during the first week by doses of 25–50 millions whenever there is a rise in the temperature has been practised. In pneumococcal eye infections an initial dose of 250 millions is appropriate, and in pneumococcal septicæmia 10-25 millions.

It is probable that a large percentage of failures with stock vaccines is due to the vaccine not conforming in type with the infecting organism. Stock vaccines must be polyvalent and polyvalent in each of the types peculiar to the country. Autogenous vaccines are clearly preferable.

The percentage of cases of pneumonia due to bacteria other than pneumococcus is probably very much greater than is supposed. This was verified by the experience of the widespread epidemics in 1918–19 of so-called 'Spanish flu.' In cases **where pneumonia is said to supervene upon influenza,** the infection is a double one from the beginning, and much may be done to prevent the pneumonic attack by giving 25–50 million doses of Pneumococcal Vaccine, combined with 50–100 millions of *B. Influenzæ*, as early as possible during the influenzal attack.

Prophylactic Inoculation. Sir A. E. Wright found that doses up to 40,000 million produced nothing more than a slight constitutional disturbance and slight rise in temperature. Lister advises a vaccine of four types containing 6,000 millions per Cc. of each type, making a total of 24,000 million per Cc. Of this 1 Cc. is given as initial dose twice repeated at intervals of 7 days. Borel holds similar views and he inoculated Senegalese troops in France with initial doses of 32,000 million without ill effect.

For white races work of investigators of the Rockefeller Institute shows that initial doses of 1,000 million each of the prevalent strains can be safely used and that with lower doses full immunity may not be secured. After 7 days either 1,000 or 2,000 million is given and a further 2,000 million 7 or 14 days later.

Prophylactic injections in the 1918 epidemic given to 230 persons, 100 illion pneumococci and streptococci and 50 million B. Influenzæ being the st dose and after a week double these doses to 90 of them. The remaining 0 had equal numbers of each organism. In some a third dose of 400 million d in a few 800 million was given. At an Institution 112 of the staff were oculated twice leaving a balance of 53 not treated. Of the 112 two only d mild attacks; of the 53, 25 had mild attacks in June and escaped in the tter epidemic; one had a mild attack in February and subsequently severe oncho-pneumonia, 14 of the remainder escaped in the earlier part of the idemic but contracted influenza later, two with severe broncho-pneumonia d one dying. These small doses give clearly some measure of protection. —W. H. Wynn, L. i./18,874. *See also this worker's recommendations in atment of acute influenza and influenzal broncho-pneumonia under Influenza.*

Prophylactic vaccination against lobar pneumonia. Vaccination of healthy ung adults gives protection for a short time against lobar pneumonia due the fixed types, but of no value in terminal or broncho-pneumonia.—W. H. rk, Int. Conf. Trop. Am. '24,834,856

VACCINES IN PNEUMONIA—striking effects. No advantage in using 1,000 illions of detoxicated vaccine if 100 millions of ordinary vaccine will produce e same or better results.—W. H. Wynn, L.ii./22,495.

Good results from doses of 100 million for an adult and 50 million for a child. -A. Erian, Pr., Dec. 23, 430.

A medium dose of stock pneumococcal vaccine is free from risk and appears be of value in many incipient cases of pneumonia.—J. Stavely Dick, . ii./25,1110.

Vaccine treatment of acute lobar pneumonia.—W. H. Wynn, B.M.J. /27,480. *See also* Sir James Barr, Pr. Feb. Mar., '28.

Types of Pneumococci. Work at the Rockefeller Hospital divided 454 cases lobar pneumonia into 4 types. Type I. was responsible for 33%, Type II. r 29, Type III. for 13 and Type IV. for 20. (The strain found among the acks on the Rand appears to be Type IV. F. S. Lister has in addition these separated 4 additional types in S. Africa.) Type IV. (now called roup X., see below) predominates in the pneumococci found in the mouths 50% or more of normal persons.—B.M.J. i./18,57.

F.S. Lister refers to about a dozen types of which A, B and C are responsible r 60% of cases in S. Africa. 'A' group is predominant in the Transvaal atives. It is not seen in America. 'B' and 'C'=the American II. and I. hese latter are the most important in the etiology of lobar pneumonia. A ophylactic vaccine of 'A,' 'B' and 'C' was encouraging. Types 'E,' 'H,' J' and 'K' might well be included.—B.M.J. i./18,351.

Anti-pneumococcic Serum.—*Dose*, 20 to 50 Cc. into the lumbar or uteal region as early as possible, repeated the following day, or ntil temperature falls.

ype I. Pneumococcic Serum.

As the types of pneumococci (see *antea*) have in general a high egree of specificity a homologous serum is necessary The imune serum against Type I. is of great therapeutic value but those orresponding to Type II. and others have not yet proved effective -they only contain a very low content of antibodies. The use of rum should therefore be confined to cases proved to be of Type I. or details of manufacture of this serum see Cole & Moore, Jl. Exp. ed., Baltimore, 1917, XXVI., 537–561, also other references r B.M.J. i./18,58. A dose of 90 to 100 Cc. of the serum repeated ght-hourly unless contraindicated till at least 250 Cc. have been ven is advised by these American workers. They advise also a eliminary intradermal test to remove all risk of grave consequence om anaphylaxis. If there is any indication of its existence the e of very small doses (initial 0·025 Cc.) intravenously slowly jected is recommended every half-hour, doubling the dose each time until 25 Cc. have been given. Results with Type I. serum were satisfactory. 63 American soldiers were treated with mortality of 8%. Among the uninoculated the mortality was 39%.

Ministry of Health Report No. 18 (1922) confirms that it has not yet been found possible to prepare a serum for cases of pneumonia not due to Type I. Knowledge is needed as to the nature of reactions between a micro-organism and its animal host. The pneumococcus and Pfeiffer's bacillus are both common inhabitants of the upper respiratory tract, non-pathogenic and harmless saprophytes in apparently healthy people. They are both intimately associated with 'colds' but the pathogenic role of the pneumococcus is accepted while the pathogenicity of Pfeiffer's bacillus is uncertain. Pfeiffer's bacillus is, however, known to be toxic and its presence in the tissues cannot be regarded as innocuous. It will probably take some years to prove whether Pfeiffer's bacillus is, or is not, the cause of influenza.

CONFERENCE ON STANDARDISATION. Decisions. The Conference accepted the American Types I., II. and III., as standards for international purposes. The term 'Group X' to replace 'Type IV.' (a collection of heterogeneous strains). The action of the serum to be investigated in properly equipped institutions.—L. ii./22,1293.

Bacteriological and clinical observations on pneumonia and empyemata with specific reference to the pneumococcus and to serum treatment. Med. Res. Council, Special Report Series 79—Type I. Serum investigated clinically gave encouraging results in 6 cases.—B.M.J. ii./23,618.

Pane and Renzi's Antipneumococcic Serum

Supplied in two strengths, Nos. 1 and 2.

Dose.—15 Cc of No. 1 repeated, if necessary, in 24 hours, is of value, especially in severe cases with high temperature and rapid pulse. Improves tone of pulse where there is great heart weakness. The toxin secreted by the coccus appears to act on the muscles of the heart and weakens it.

Site of Injection.—Subcutaneous tissue of the abdomen.

If patient very weak the Serum may be given per rectum—the bowel being previously washed out by an enema of warm salt solution.

Diagnosis.—In suspected cases examine the fauces for pneumococci. The use of antiseptic gargles may check further infection.

Pneumococcal Meningitis treated by Pane's Antipneumococcic Serum *per os.* 5 Cc. doses *mane*, no food being given for two hours before or two hours after. Dose *per os* double that necessary hypodermically. Lumbar puncture simplified by Eucaine and Adrenalin hypodermically.—W. Broadbent. B.M.J. ii./16,586.

Pneumonia treated with serum intravenously and Adrenalin. 70% cleared up rapidly.—Renaud, B.M.J.E. ii./21,9.

Pyorrhœa Alveolaris.—It is probable that in very early cases of pyorrhœa alveolaris the bacteriology of the condition may be a relatively simple one, *Streptococci*, *Pneumococci*, *Staphylococci* and *M. Catarrhalis* alone or in combination being probable causes; later on, secondary infection by spirochetes, streptothrices and vibrios inevitably occurs and these may entirely replace the original invaders. Observations have shown that **Vincent's Fusiform Bacillus** alone may be responsible for most intractable ulcers, while cultures of the above organisms in liquid media are intensely toxic; the view, therefore that they may be responsible not only for the local but also for the general toxic symptoms in advanced cases of pyorrhœa is more than justified.

H. K. Box's view of the pathology.—L. i./25,84,153.

Pyorrhœa Vaccine. *Syn.* **Parodontal Streptococcus Vaccine,** Containing the *Streptococci* and *M. Catarrhalis*, and the *Spirochætes* and *Streptothrices* in small doses is used. A Vaccine of this kind is supplied in doses of 5, 10, 25, 50, 100, 250 and 500 million. Emetine has been employed in treatment. *See* p. 530.

A description of the bacteriology of a large variety of organisms found in pyorrhoea alveolaris. Opsonic Index estimations were made. It was found that a low index was shown to certain bacteria taken from the mouth in cases having some form of constitutional disturbance, *e.g.*, toxæmia, anæmia, various forms of gastric and intestinal indigestion. Injections of Vaccine.

An Emulsion of Sublimed Sulphur in Glycerin used to cleanse the mouth and gums in cases treated by Serum and Vaccines. It had marked **effect on the local inflammation and pain.—Sir Kenneth Goadby.**

Autogenous vaccines of advantage in pyorrhœa alveolaris when associated with energetic local treatment, but useless without it. —G. B. Pritchard, L. i./27,92.

Streptococcus Salivarius normally in the mouth is harmless, but may be pathogenic, as in pyorrhœa alveolaris.—B.M.J. i./11,693.

Entamœba buccalis has been stated to be responsible for pyorrhoea (Barrett of America and Chiavaro of Italy). Amœbæ in the mouth have been observed by many since 1849. Entamœba Buccalis is 6 to 30 micromillimetres in diameter, lively in motility, poor in chromatin, with a thick membrane. It has been found by Barrett in nearly every pyorrhoea pocket examined.—J. S. White, P.J. i./15,797.

Relapsing Fever.—See *Vol. II.*, also Salvarsan chapter.

Rheumatism.

Pathogenesis and Treatment of Rheumatic Fever (and Chorea).

Rheumatic Fever—an acute specific disease. *Diplococcus Rheumaticus*,—an organism found by Poynton and Paine growing in short chains, Gram +, forms Lactic, Formic, and Acetic Acids and curdles milk—is the supposed cause of the disease. The organism has a strong vitality on Blood Agar. It may be shown in all rheumatic lesions, though with difficulty.

It is believed that the *S. Rheumaticus* is a variety of *S. fœcalis*, and other streptococci have been found in cases of rheumatism, but *S. Rheumaticus* is the most common variety.

The organism produces ½ Gm. of Formic Acid (also Acetic Acid) from a litre of culture. The urine of rheumatic patients contains up to 0·2 Gm. in a day's urine. Salicylates administered decrease the amount. This acid **is** not known to be produced in like amount by streptococci from other sources.

Streptococcus Rheumaticus Vaccine (Wimpole Institute) for complications of rheumatic fever. *Initial dose* 5 to 10 millions.

In doubtful cases of rheumatic arthritis a dose of 250 to 500 millions of *Streptococcus Rheumaticus* may be given diagnostically, and the temperature observed every four hours for 24 hours; a marked temperature or local reaction will assist greatly in establishing the diagnosis. **Ampoules** containing doses of 5, 10, 25, 50, 100, and 250 millions are prepared.

Association of Disease of the Mouth with Rheumatoid Arthritis and certain other forms of rheumatism. In diseases of the jaws, especially rarefying alveolar osteitis, a strepto-bacillus was isolated. Pure Cultures inoculated into or around the knee joints of rabbits produced symptoms like arthritis deformans. Treatment of cases by autogenous Vaccines made from the organism effected amelioration and disappearance of the symptoms in a number of cases. Initial dose was 10 millions, subsequently 150 and 200 millions. First given at periods of ten days, then at fortnightly intervals for six months, and afterwards at intervals of six weeks for a year. There was generally increase of arthritic pain and swelling by the first injection. It is better to reduce the initial dose to avoid this exacerbation.—Sir Kenneth Goadby, L. i./11,639.

Neutral Red Egg Medium (Fleming's) is used for cultivating the organism from the urine. Extreme caution in the use of this Vaccine is necessary. Even 500.000 may cause a most unpleasant reaction and until the urine is free from organisms more than 5 million can seldom be given.

Chronic arthritis. Streptococcal Infection is frequently concerned in chronic arthritis. 20 cases treated by Vaccines of Streptococci derived from various sources—either from the mouth in cases of oral sepsis (gums), from the urine or from the fæces (*S. fæcalis*). Six of the cases much improved, six showed some improvement, six unchanged.—D. W. Carmalt Jones, B.M.J. i./13,1047.

Using cultures of *M. rheumaticus* (of Poynton and Parnet Beattie) Ralph Stockman was unable to produce in animals symptoms of lesions of rheumatic fever. Certain Vaccines likewise of the killed organisms failed him in patients suffering from rheumatism.—B.M.J. i./13,597. We provide further abstracts of this paper under Salicylates, p. 69.

Rheumatoid arthritis is due to *Staphylococcus epidermidis albus* (var. *deformans*). Vaccine given with encouraging results. The initial dose in the majority of cases was 500,000. The interval with small doses was 3 days, with large doses a week.—H. Warren Crowe, B.M.J. ii./20,815.

Treatment should aim at the removal as far as possible of the infective cause. Vaccine therapy should never be used until the focus of infection has been removed as far as possible.—Sir W. Willcox, Int. Soc. of Med. Hydrology at Pistany, Czecho-Slovakia, B.M.J. i./26,1045.

The initial dose should be one million and after the first three or four doses the increase should be 25 or 50% of the previous dose, the interval between the first few doses being 3 or 4 days and later a week.—K. Stone, Pr., Sept. '27,183.

Rapid improvement following subcutaneous injections of *B. fallax* vaccine, but some cases failed to respond. *B. fallax* is an organism occasionally isolated from gangrenous wounds and cases of puerperal sepsis. It is not a universal infective agent, but is much more prevalent than might be imagined. Advisable to add the organism to autogenous vaccines in treatment of chronic arthritis, especially when joints have been damaged previously by injury or are the seat of disease non-pyrexial and insidious from the onset.—J. and N. Mutch, L. i./27,1022.

Rheumatic infection in childhood. Good town-planning essential.—B.M.J. ii./25,788.

B. Coli Vaccine intravenously in rheumatoid arthritis, see B. Coli.

Septicæmia, Anti-Streptococcic Serum.

Dose.—30 Cc. early in any form of septicæmia, and repeated every six hours if necessary. Injections are made under the skin of the abdomen or flank or at the seat of inflammation, if any, as in erysipelas, so as to produce good local effect. Usually supplied in 10 Cc. phials.

The preparation of the **Lister Institute** introduces a large number of strains (hæmolytic, non-hæmolytic and *S. fæcalis*). They are obtained from a number of infections, *e.g.*, erysipelas, septicæmia, endocarditis, uterine infections, influenza, appendicitis, etc.

Special Anti-streptococcic Sera for use in **Erysipelas, Puerperal Fever, Scarlatina, Endocarditis and Rheumatic Fever,** are obtainable.

PUERPERAL FEVER and the varied forms of septicæmic infection following childbirth have been treated in many instances with it with good results.

Serotherapy results in puerperal infection are inconstant. Preferably given intravenously in the earliest stages: also used locally—50 Cc. introduced into uterine cavity daily. To prevent acclimatisation of infective organisms large doses (60–100 Cc.) must be given for the first three or four days and the treatment then suspended. In benign cases, vaccines are preferable, but they are useless and even dangerous in profound general depression and asthenia, very acute septicæmia, or with cardiac, renal, or adrenal deficiency. Dose still largely empirical, but preferable to begin with small ones.—B.M.J.E. i./25,24.

Anti-streptococcic serum in septicæmia hardly justifiable—serum sickness. An effective method of immunising donors needed.—L. Colebrook, B.M.J. i./25,659.

Indicated in simple septicæmia or sapræmia. Erysipelas, endocarditis, carbuncle and acute rheumatism have been treated with it.

Scarlet Fever Antitoxin. *Syn.* SCARLET FEVER STREPTOCOCCUS ANTITOXIN CONCENTRATED (Globulin).

Dose for treatment.—10 Cc. usually establishes normal temperature in 36 hours and the quarantine period is shortened in many cases by nearly 50%. If given early, it generally arrests the progress of complications and may lessen the severity of complications already developed.

Prophylaxis.—2·5 Cc. for children of 5 to 15 may confer passive immunity for 10 to 14 days.

Diagnosis. (SCHULTZ-CHARLTON REACTION.)—The diluted antitoxin is injected intradermally into an area where the suspected rash is most marked and will, in the case of scarlet fever, produce the characteristic rash-fading.

Scarlet fever, confirmed by a marked Schultz-Charlton reaction (intradermic injection into the rash of 0·2 Cc. horse scarlet fever antitoxin) and a positive Dick test, treated by 25 Cc. unconcentrated scarlet fever antitoxin intramuscularly.—E. H. R. Harries and co-workers, B.M.J. i./26,864.

SCARLET FEVER. PROPHYLACTIC INOCULATION. The subcutaneous injection of 0·0001 Cc. of the blood of a scarlet fever patient into children produces no reaction but confers a degree of active immunity sufficient to prevent occurrence of the disease on introduction of the virus contained in 0·15 Cc. of blood.—I. Takahashi. L. ii./21,645.

Immunity conferred by a toxin which had been detoxicated by the addition of an equal volume of 2% Sodium Ricinoleate solution. There were only negligible reactions and the preparation has the advantage over the ordinary toxin-antitoxin mixture of not sensitising the child to Horse Serum. Since it is possible to effect immunisation in one dose, the chief objection to active use against diphtheria and scarlet fever is removed.—W. P. Larson, Minnesota, L. ii./25,824. See also L. ii./26,1231.

Specific antitoxin in the treatment of scarlet fever.—A. G. Robb, B.M.J. i./26,11; *ibid.* i./26,26.

By injection at 5 to 14-day intervals of gradually increasing doses of 1 in 1000 dilution of scarlet fever toxin (commencing with 0·2 Cc.) the majority of Dick-positive reactions are rendered Dick-negative without ill-effects, but larger injections necessary to confer lasting immunity in cases originally strongly Dick-positive.—W. T. Benson and G. W. Simpson, L. i./27,283; see also D. S. Sutherland, *ibid.* 291.

Further on Dick Test and Prophylaxis, see Vol. II.

Scarlet fever and ice cream. An ice-cream maker fell under suspicion and hæmolytic streptococci were recovered from him, producing typical reactions in individuals submitted to the Dick Test.—B.M.J. ii./25,774.

Control of scarlet fever in a children's hospital.—D. McClean, L. i./27,483.

Streptococcus Conglomeratus Vaccine is prepared for the complications of **scarlet fever.** *Initial dose* 5 millions.

In view of the fact that Anti-streptococcic Serum has been a failure in a large number of cases of erysipelas, pyæmia, etc., and recognising that the streptococcus is a very large genus—it may be desirable to prepare an autogenous vaccine.

Streptococcus Vaccine may be employed in localised infections, as erysipelas, lymphangitis, ulcers, sinuses, tonsillitis, adenitis and mastitis; also in asthma and bronchitis, and in generalised infections such as septicæmia and pyæmia, provided the Streptococcus has been proved to be responsible. *Initial dose* in very acute and in generalised infections should be 5 or at the most 25 millions; in more chronic conditions a dose of 25 to 50 millions is suitable. **Ampoules** for Hypodermic use are supplied containing 5, 10, 25, 50, 100, 250 and 500 millions.

ERYSIPELAS.—Diagnosis can be based on the 'spread of the erythema from a local focus,—true inflammation of the epidermis with exudation of leucocytes, —not merely a transitory erythema due to vascular dilatation, as occurs in cellulitis and lymphangitis.' It is caused by one of the organisms of the Streptococcus class.—*Streptococcus pyogenes* being most frequent.—L. ii./09. 1070.

FOUL BREATH.—Case of bacterial infection of the stomach well cured by a Vaccine prepared from patient's organisms, a combination of Streptococcus from the urine and B. Coli from the stomach—four injections were given at intervals of one week, the range of doses being Strepto and Coli of each 5 increasing to 20 of each. B Coli is usually found in the stomach in obstruction of the pylorus due to malignant disease. No previous case recorded by an infection of the stomach by this organism with normal gastric motility —M.P.C. ii./11,528; B.M.J. ii./11,1593

SEPTIC SORES AND NILE BOILS well treated with Streptococcic Vaccine in the former and Staphylococcic in the latter.—H. Warren Crowe, L. ii./18,667.

HÆMOLYTIC STREPTOCOCCI often present in throat swabbings especially where tonsils are enlarged, also in cultures of the pharynx but not in gum margin or in nose. Largely prevalent in scarlet fever, measles, influenza and lobar pneumonia. In respiratory complications the actual cause of the disease may so act on the respiratory mucous membrane as to render it susceptible to attack by these streptococci. Is it possible to render individuals immune to the action of these organisms, often starting with a sore throat? Mouth antiseptics recommended. Classification of types of organisms based on hæmolytic and immunological reactions.—J. M. Beattie, B.M.J. ii./21,786. See also J. H. Dible, *ibid.* 789.

Infection of the teeth and gums: a useful classification of the various complications arising. Intestinal infections frequently result from dental infection. *Plombières colon irrigations* or autogenous vaccines made from the streptococci found in the teeth and intestine may be of value.—Sir William Willcox, B.M.J. i./23,53.

PUERPERAL FEVER.—*Autogenous Streptococcus Vaccine* found efficient in.—B.M.J. ii./22,644. Previous refs. in 18th Edn., p. 909.

Puerperal septicemia well treated with local dressings of gauze impregnated with streptococci, the dressings being changed from three to five times in 24 hours. Not less than three dressings were applied, even when the fever subsided after the first. Of eight cases thus treated, all recovered.—Presse Med., per Jl. A.M.A. ii./25,780.

Operations on the lower part of the alimentary tract liable to suffer infection. Ten days before give a vaccine of streptococci and B. Coli, repeated three days before the operation, and on the night before, 8 Cc. of 2%Nucleinic Acid.—P. P. D. Wilkie, B.M.J. ii./23,189.

ERYTHEMA NODOSUM treated by antistreptococcic serum.—A. H. Carter, B.M.J. ii./23,414.

OSTEO-ARTHRITIS of the hip joint treated by vaccines made from streptococci obtained from foci of infection.—H. Warren-Crowe, B.M.J. ii./26,834.

Streptococcus Vaccine and Staphylococcus Vaccine, combined with acne bacillus, have no therapeutic value—omitted from N.N.R.—Y.B.P., '26,223.

Staphylococcus Vaccine (*S. albus, S. aureus* and *S. citreus*) also *Mixed* Vaccine—*S. Albus* and *S. Aureus* in equal proportion.

Dose.—Initial 100 millions, increased to 1,000 or even 5,000 millions.

In cases of acne, *Staphylococcus albus* is commonly associated with the Acne Bacillus (*q.v.*). In boils, carbuncles, sycosis, ulcers, and sinuses generally, and in acute generalised infections, such as pyæmia, ulcerative endocarditis, septicæmia, and peritonitis, either *S. Albus* or *S. aureus* may be found, but the *S. aureus* is relatively the more common. The mixed vaccine may if necessary be used.

A CARBUNCLE is less easy to cure than boils, because the blood cannot be brought into effective contact with the germs. Administer Citric Acid internally to diminish its coagulability and apply locally a solution of Sal and Sodium Citrate to decalcify the lymph; in nine cases out of ten of boils 100 million Staphylococci will cure.—Sir A. E. Wright.

Furunculosis. If no improvement after three or four injections make an autogenous vaccine.—Athole Ross, Pr., July, '13, 100.

Eczema, acute, when the suppuration is not controllable by ordinary means and the stage of "chronic" pus infection is reached has been well treated.

Tetanus.

Amyl Nitrite inhalation is valuable for checking the dangerous spasms of the glottis and respiratory muscles.

Oxidising Antiseptics, for example Hydrogen Peroxide, Potassium Permanganate, Chlorine water and Iodine Solution are unfavourable to the anaerobic growth of the organisms. They have the power of rendering toxin non-toxic, but *there is no evidence that Phenol* (Bacelli's method) *or Magnesium Sulphate injections* (*vide* p. 547), *have any effect on the course of the disease.*

Oxygen injections delayed death of guinea-pigs inoculated with fresh bouillon and agar cultures of B. Tetani. Suggested for treatment.—H. O. Howitt and D. H. Jones, L. i./15, 752.

Bromide and Choral may be needed; large doses of fluid are advised.

Use Iodine locally, it has destructive action on the toxin.

Tetanus Antitoxin.

(*Special provisions are made as to the manufacture of this Antitoxin under the Therap. Subs. Act* 1925 *and Regns.* 1927.)

The **Lister Institute** advises as follows:—

(1) ***In Acute Tetanus.*** At first sign of tetanus give very large doses energetically and continuously—16,000 to 20,000 U.S.A. units beneath the spinal arachnoid (in the usual position for lumbar puncture) and the same amount intramuscularly on the outer side of the thigh into the body of the vastus externus muscle. If no improvement at end of 12 to 18 hours repeat the doses once a day for 3 to 4 days. Later diminished doses subcutaneously, but patient is not out of danger for a long period.

Warm the serum first to 99 *or* 100° *F. before injecting.*

Rise in temperature with rashes which should pass off.

(2) ***Premonitory Symptoms.***

General restlessness suddenly changing to a desire for rest and vice versa. Unreasonable outbursts of temper. Increased nervousness. Sleeplessness with distressing dreams and may be nightly delirium. Temporary giddiness, violent headache, excessive yawning, diffuse backache. Trembling of the tongue which is put out to one side. Some local swelling, without redness, of the injured member and throbbing of its arteries notwithstanding that the limb is raised. Slight jerking may follow pressure on the flexor tendons and increased irritability of the muscles. A profuse sweating and darting pain in various parts. Difficulty in micturition, due to spasm of the sphincter vesicæ, which may last from a few minutes to half an hour. Changes in the facial appearance, the patient *looks* anxious, though there is as yet no *risus sardonicus*. Increased flow of saliva, spasmodic cough. Earache, stiffness at angle of jaw. Difficulty in swallowing. Tremors and clonic spasms which are not painful and may not attract attention. Pain persisting after muscular contraction induced by effort.

(3) ***Prophylactic Use of Antitoxin and Treatment of Wound.***

Dose.—At least 500 U.S.A. units to be given *under the skin of abdomen or flank* in every case of injury where possibility of B. Tetani infection. If there is soiling of the wound or there is much dead tissue in a wound which is several days old before observation give 1500 to 3000 units intramuscularly 3 to 6 hours before operation if the latter is needed. Use Iodine in the local treatment of the wound as it has strong destructive action on Tetanus Toxin. Intramuscular injections are preferably given in the outer side of the thigh (into the body of the vastus externus muscle).

U.S. X. has an **Antitoxin Tetanicum Crudum.** *Syn.* Antitetanic Serum, having a potency of not less than 150 units per Cc.: and a *purified* serum, **Antitoxinum Tetanicum,** with a potency of not less than 300 units per Cc. The latter is a solution of the antitoxin-bearing globulins. In both products the amount of preservative must not exceed 0.5% Phenol, or 0.4% Cresol.

Dose.—(Hypodermic) of either of these 10,000 units. Protective 1,500 units.

Experience gained in the first year of war confirmed the opinion that 500 to 1,000 U.S.A. units is sufficient prophylactic dose for the majority of cases. In severe wounds repeat once or twice at intervals of a week.—A. T. MacConkey.

P. JAP. IV. has **LIQUID SERUM,** with not less than 5 Behring units in 1 Cc. also **DRIED SERUM** of potency at least 50 Behring units in 1 Gm.

For treatment at least 3 000 units intrathecally (intraspinally). At the same time 10,000 units to 20,000 units intravenously and subcutaneously. To be repeated as frequently as the course of the disease seems to demand.—Sir D. Bruce, B.M.J. ii./15,593. *See* also below.

W.O. Committee Memorandum.—*The best results are obtained by intrathecal (intraspinal) injection* at the earliest stage repeated for three or five days and supplemented by intramuscular doses. When operating at the site of wounds give as prophylactic 500 units or more intramuscularly two days before the operation. Intravenous injections should not be made owing to risks of anaphylaxis.—Detailed method of giving intrathecal injection.—B.M.J. ii./16,647,660. Sir D. Bruce, L. i./17,680,986, see also F. W. Andrews and T. J. Horder, *ibid.* 682, F. Golla, *ibid.* 686; M. Greenwood, *ibid.* 687; J. Gow, *ibid.* 689.

Effectual daily dose is about 10,000 to 12,000 units—the bulk of it to be given intravenously. There is grave danger in interfering with the infected surface of a wound when tetanus has declared itself. This does not apply to amputation above the site of injury.—R. G. Abercrombie, B.M.J. i./16,339.

The duration of the complete passive immunity conferred by a dose of Antitoxin is short—enormous doses would have to be given to obtain immunity for a *length* of time. 250 U.S.A. units would protect a man—weight for weight as compared with a guinea-pig—for a week. 500 units would allow for the man being twice as susceptible.—A. T. MacConkey and A. Homer, L. i./17,259.

Anaphylactic Shock.—The danger of this is negligible when the prophylactic dose is contained in such a small quantity as 2 to 3 Cc. of horse serum. In curative treatment where massive doses have to be given the case is different. Small subcutaneous doses rapidly increased remove risks.—L. i./17,105,114.

Prophylactic injection prolongs the incubation period enormously on infection. Tetanus may therefore occur after wounds have healed. Five mild cases treated intramuscularly and subcutaneously, all recovered. Six cases intrathecally. Fourteen intravenously—some of these by a single dose of 30,000 U.S.A. units. 13 recovered.—H. R. Dean, L. i./17,673.

The toxin of Tetanus is transported to the central nervous system along the motor nerves. Therapeutic use of Antitoxin is fully justified and indeed imperative. It is impossible to say in a case whether the toxic dose already in the nervous system is or is not a fatal one. The prompt use of Antitoxin may neutralise just the last amount of toxin in the blood which if it had got into the nervous system would turn the balance against the patient.—F. Ransom; L. ii./17,928.

The toxin passes mainly along the perineural lymphatic clefts.—Teale and Embleton, Jl. Path. and Bact., Vol. 23, '19.

C. S. Sherrington, "Antitetanus Serum in the Monkey," *ibid.* 964. F. Golla.—Statistics *ibid.* 966. R. N. Salaman—Ten Cases *ibid.* 971.

Potency of Tetanus Antitoxin enhanced by addition of pulverised tapioca.—Ramon, Comptes Rend., per Jl. A.M.A. ii./25,1337.

Preparation of Tetanus Antitoxin.

The method of preparing Tetanus antitoxin consists in rendering animals immune to the tetanic poison by repeated inoculations of increasing quantities of the tetanus toxin, after first protecting them with a large dose of tetanus antitoxin. The animals are then bled and the serum prepared and preserved.

Units of Immunity.—The U.S.A. unit established by a Decree of Congress is commonly employed. It consists of ten times that amount of Antitoxin which when mixed with the Standard Test dose of toxin and injected beneath the skin of a guinea pig weighing 340 to 370 Gm. saves the life of the animal for more than 96 hours. For further information see McConkey.—B.M.J. ii./14,609, and ii./15,849.

DIFFERENCE IN RATIO OF UNITS. Experimental work needed to investigate further. International Conference at Paris.—L. ii./22,1294.

Dry pulverised Anti-tetanus Serum as a Wound Dressing.—This is dusted on wounds which may have become infected with dust, mud, &c. Infection may thus be prevented; in addition apply antiseptic dressing. Tetanus may also result in new-born children owing to infection at the umbilicus after birth—sometimes from the use of Fullers Earth.—W. W. W. See also p. 143.

Intra-Cerebral Injection of Anti-Tetanic Serum has been practised. The injection must be concentrated and free from antiseptic. A blunt needle is used.

Subdural injections of large doses encouraging. 1,500 units given through a drill in the cranium in addition to intraspinal and intramuscular injections. One patient received 36,000 units intravenously and intramuscularly in a week.—B.M.J. i./16,620.

It has been determined that tetanus spores free from toxin and extraneous micro-organisms do not produce tetanus, but the spores remain quiescent in the tissues for long periods, and when an **Injection of Quinine** or **Calcium Chloride** or **Lactic Acid** is given, necrosis of the tissues surrounding the site of injection occurs and should any of these dormant bacteria gain access to this locality they may light into activity and produce tetanus.—F. H. Teale.

For **Veterinary use** the Lister Institute supply 1500 units for prophylaxis. The horse injected with Tetanus Antitoxin is not rendered *permanently* immune. *Protection* is a matter of weeks or months at the outside.

Antitetanus Toxin will prevent tetanus in animals if given before tetanus inoculation, but it has no effect after. During the war the subjects of tetanus were, so to speak, *flooded* with tetanus antitoxin—those cases only recovering which were not acute or chronic. F. H. Teale's work demonstrated the reason, namely that the antitoxin does not gain access to the spinal cord through the circulation.

Delayed tetanus treated with large doses of serum—a total of 236,500 units given intrathecally after lumbar puncture. Acts quicker than intramuscular or subcutaneous.—S. E. Denyer. L. i./21,1356.

Passive immunity against tetanus. Work to determine how far the antiserum protects against infection with *B. tetani* as distinct from tetanus-toxin. To cause infection with multiplication of tetanus bacilli and development of the spores, the local defence of the tissues must be broken down by some such agents as ionizable Calcium Salts or Colloidal Silica.—Gye and Kettle, B.M.J. i./22,74.

Growth of tetanus bacilli takes place between **PH**5 and 8·5 the optimum being 7 to 7·6. For tetanus toxin the stability zone is between PH5·8 and 8, the optimum being 6·0 to 7·5.—J.C.S.A. i./1922,303.

Anaphylaxis to 500 U.S.A. units of serum.—R. S. Woods, B.M.J. ii./21,11.

Anaphylaxis, delayed. Two cases, one due to Antidiphtheria Serum following Antitetanic Serum, and the other due to two doses of Antitetanic Serum, the interval being six years.—J. Gillman Moorhead, M.P.C., Nov. 8/22,387.

Case of tetanus reported without evident source of infection.—J. W. Goler and C. M. Reitz, M.P.C., Jan. 24, 23,73.

Trypanosomiasis. *Vide Vol. II.*

Tuberculosis.

Tuberculous Milk as source of Infection, vide Vol. II. under B. Tuberculosis. See also Nutrimenta, Boiled v. Unboiled Milk. Vol. I. p. 587. *For the continuous antiseptic inhalation treatment of pulmonary tuberculosis see* pp. 128, 386.

Tuberculosis Notification Order.—This order was designed to complete the organisation for ensuring notification of all cases to health authorities. A medical practitioner is not required to notify any case which has already to his knowledge been notified either under this Order, under the Poor Law Order (1908), or under the Hospitals Order, if the notification has been made to the M.O.H. of the Area within which the patient resides; but if a patient who has been notified in the area of one Sanitary Authority removes into another a fresh notification to the M.O.H. of the new area should be given. Patients in a prison, reformatory, school or lunatic asylum and patients in a Poor Law Institution, or under the care of a Poor Law District M.O., are not to be notified under this Order, nor are applicants for life insurance, nor a passenger or member of the crew of an emigrant ship, nor an inmate of any building, ship, vessel, boat, cart, van, shed, or similar structure belonging to His Majesty the King. Multiple notification results but steps are taken to prevent it affecting statistics on prevalence.

The notification is unpopular.—R. Dudfield, B.M.J. ii./22,869.

Australian quarantine.—Any passenger deemed to be suffering from tuberculosis, even in an early stage, is usually prohibited from landing—or a heavy bond is exacted binding him to leave if not recovered at the end of six months.

Tuberculosis Order 1925 (*Regarding Cows*).

Every cow suffering from tuberculosis of the udder, or giving tubercular milk, and every bovine animal suffering from tuberculous emaciation, or chronic cough, and showing definite clinical signs of tuberculosis is to be destroyed. Every person in charge of such an animal is to notify a police constable, or inspector of the local authority. Veterinary surgeons in private practice to notify such cases to inspector of local authority. Owing to lack of co-ordination between Agricultural Committees and Public Health Committees, very little will be accomplished in the way of reducing bovine tuberculosis under the Order. Whole-time veterinary surgeons necessary for every county of any size.—W. G. Savage, L. i./27,722-725.

PROGRESS OF INFECTION IN PHTHISIS. — Tuberculosis causes immunity—the resistance is a very specific matter,—the apparently strong may succumb to it. It is commonly assumed that resistance goes hand in hand with general bodily health. There is a menacing danger of the infection of new areas and everything should be done to avoid this; absolute rest in bed in the early stages will do it and should be acted upon without fear that the general health will suffer.

Experiments made for the Tuberculosis Commission showed that some degree of immunity to bovine tuberculosis can be induced in calves by injecting them with cultures of Tubercle Bacilli of the human type. Similarly in man the disease tends to confer some immunity, and it is on the acquisition of the new or improved powers of resistance which are the cause of the immunity slight though they be, that the hope of recovery mainly depends. Experiments showed further that in man, as in the ox, the severity of a tuberculous infection is largely determined by the number of Bacilli gaining entrance at the start. In its tendency to produce immunity tuberculosis differs from other diseases only in degree. During the course of infection the powers of resistance are constantly increasing.

A tuberculosis patient, under a doctor, will improve for a time, no matter what drugs, vaccines, or treatment be employed, owing to the nursing, regulation of food, exercise and sleep, etc. If this were recognised, 'treatments' would diminish. Records must be kept for years before the value of a remedy can be gauged.—W. E. Dixon, B.M.J. i./25,813,815.

The tubercle bacillus can probably enter the body through either the respiratory or digestive route.

Bactericidal action of **gastric juice** (removed by Einhorn tube) on B. tuberculosis. The protection afforded by gastric secretion is apparently by no means perfect. The investigation may have important bearing on portals of entry of the bacillus.—J. Inkster and S. R. Gloyne, B.M.J. ii./21,1024.

ÆTIOLOGY, PREVENTION AND TREATMENT OF PHTHISIS. It needs to be written in the heart of every sanatorium that sputum—contaminated dust of lwellings, streets, buildings and public places, inhaled and ingested with the air and in food—is the most frequent cause. "It is a filth disease" (Simon).—Sir R. Douglas Powell, Pr., Jan. 1922, p. 1.

Projection of tubercle bacilli by coughing and sneezing. Illustrated preventive propaganda in Germany.—M.P.C., Nov. 15/22,406.

FLIES AS CARRIERS OF INFECTION.—The tubercle bacillus from sputum was found to live three days in the fly's intestine, but if a pure culture was used, it could be recovered nearly a fortnight afterwards in the intestine.—B.M.J. ii./10,1271.

Social aspect of Tuberculosis.—Jane Walker, B.M.J. ii./23,512. Milk purification (sterilisation) and segregation of the infected.—H. Batty Shaw, *bid.* 513.

Bovine tuberculosis is transmissible to children through ingestion of NFECTED MILK. Evidence of immunisation by the ingestion of living ubercle bacilli in milk is entirely unproven.—Soc. Med. O.H., L. i./21,251.

Red hair and tuberculosis. A comparison made on 353 bone and joint cases and 610 normals gave a red-haired percentage of 7 for the former and only 3.4 for the latter.—W. C. Rivers, Pr., June, 1921.

Tuberculosis in Wales. Mortality rate on the whole higher. The highest mortality occurs in the sparsely populated mountainous districts of North and West. The mortality tends to the young adult type, especially in north and west areas. More acute than in England. Faulty hygiene cannot explain. An interesting explanation is that where human beings are scattered and isoated, the passing of germs from one to another is more or less restricted except within the home, but where there is herding together and constant association as in towns, germs carried by each are passed on indifferently to his neighbours, but the number of germs so passed on may be, or probably is, relatively small n most cases except in infected houses, hence a relative immunity rather han active disease. Many leave their country homes for London or for the big industrial centres of Wales itself and many get infected with tuberculosis and go home again to die—perhaps infecting a whole household before the end. Nature is gradually getting rid of tuberculosis by a process of unconscious vaccination.—S. Lyle Cummins, B.M.J. i./22,338.

During the war 40,000 men were discharged from the British army with diagnosis of pulmonary tuberculosis. This was not due to recent infection. t is possible that conditions led to some change in chemistry of the body which enabled tubercle bacilli to attack—in other words the individual became ensitive to this micro-organism.—A. Latham, L. i./22,263. (*Cf.* abstract under typhoid).

Retrospect of 40 years in tuberculosis. In the matter of treatment the method of inhalation of antiseptics thought to be the most futile. With regard o Tuberculin there is little hope of the discovery of any drug that can destroy he bacillus without damaging the delicate tissue cells—or reach the microbes ntrenched in masses of necrotic tissue, but 'success may ultimately be chieved on these lines.'—Percy Kidd, L. ii./22,1211.

Dogs as carriers of disease to man from animal parasites and tuberculosis (and rabies). Tuberculosis in the dog can be diagnosed by tuberculin injecions.—T. W. M. Cameron, L. i./22,564.

The share of the sun in prevention and treatment of tuberculosis.—A. Rollier, B.M.J. ii./22,741.

The death-rate from pulmonary and other forms of ***Tuberculosis in 1926*** was respectively 30,108 and 7,417, as compared vith 32,382 and 8,005 in 1925.—Sir George Newman's Report for 1926, B.M.J., ii./27,499.

For the relationship between human and other forms of Tuberculosis nd tests to distinguish types of B. tuberculosis see Vol. II.

Hospitals for Treatment of Tuberculosis. The Insurance Act method of dealing with tuberculosis has failed. The lines of prevention aid down are impossible. If the respiratory route is the one by vhich human tuberculosis is engendered we have no right to ask a number of perfectly healthy men and women to act as physicians nurses, etc., etc., in institutions for the care of tuberculou pulmonary disease—and in like predicament are the children wh play in the streets and inhale the tubercle-laden dust. (Som would make us believe the dust is sterilised by the sunlight—bu sunlight is often absent in the British Isles).

If the care of pulmonary tuberculous patients is to be base on the belief that phthisical sufferers especially have caught th infection at a comparatively short time before they develop th signs it is impossible to be logical. No community could stan the application of adequate and ample rules.

Adequate sanatorium treatment for the poor—other than thos of the so-called early cases of pulmonary tuberculosis—does nc exist. The ultimate fate of these cases is sad in the extreme—the return from a stay in the fresh air to a bed-ridden end under th care of health visitors and tuberculosis officers.

The other way of tackling the tuberculosis problem, howeve is based on the view that *every* member of society *nolens volens* i infected with the tubercle bacillus in early life and only those develo the disease, the soil of whose bodies is non-resistant. The grea purpose of the Insurance Act based as it is on assumptions rathe than on fact, of trying to stamp out tuberculosis by prevention, i rendered null and void by making the advanced tuberculous subjec live in his own home. The *advanced* consumptive needs more hel than he gets.

The paper concludes with an eloquent appeal for these bed-ridde cases and " to the lasting shame of those of us who are responsib for the management of this disease, these helpless men, women an children will be sent home for domiciliary treatment, a burde to themselves and their relatives." 'Observation' Hospital are needed for doubtful cases as also Invalid Homes where thos suffering from pulmonary tuberculosis, and who are rendered in capable thereby, may be nursed and treated until they are fit t earn their living or until they die. These Invalid Homes need no be in the country. They may in fact be in the heart of populou centres and therefore near their families without being a burde to them.—H. Batty Shaw, B.M.J. ii./19,97.

Tuberculins.

There is no consensus of opinion either as regards the proper variet of Tuberculin to use or the correct dose to employ. The preparation now described are **Old Tuberculin**, **Albumose-Free Tuberculin** c **T.A.F.**, **Tuberculin T.R.**, **Bacillary Emulsion** or **B.E.**, **Ber aneck's Tuberculin**, **I.K. Tuberculin**, **Raw's Vaccine**, **Dreyer'** Vaccine, and certain other modifications.

Tuberculin, Old, **Tuberculin Koch. P.G. VI.** That of **P. Bel** is similar.

This is an amber coloured liquid—a mature glycerin broth cultu of the tubercle bacillus (*typus humanus*) concentrated to $\frac{1}{10}$ its volum and filtered, with the addition of 0.5% Phenol. It is supplied in 1 Cc. bottles. Dilutions are made with 0.5% Phenol.

The Therap. Subs. Regns. 1927 *define Old Tuberculin as proper name for this; if with the suffix 'T' the tuberculin has been made from a case of human infection, while 'P.T.' indicates made from bovine infection.*

Standardisation. According to the **Therap. Subs. Regns. 1927** the Tuberculin is compared with a standard preparation kept in the Nat. Inst. Med. Research, Hampstead. Each batch is to be tested for potency by observing its specific toxicity for guinea-pigs or other animals infected with B. *tuberculosis*. Further each batch is to be tested for non-specific toxicity and for sterility.

The precipitin test is not good for standardisation.—Von Pirquet tests n agreement.—C. C. Okell and Co-workers, L. i./26,433.

It has been used (*a*) as a *Diagnostic* both in man and beast, see p. 946, and (*b*) for treatment, but this is now little used for the purpose. Tuberculin A.F., *q.v.*, replaces it. It is however still used in the 'Dispensary' treatment of Camac Wilkinson—*q.v.*

Effects of Injection.

The tuberculin seems to act upon the tuberculous lesions, and even partly destroys them—it is not definitely destructive to the tubercle bacilli—or their surroundings, and subsequently there is a risk of further symptoms from blood poisoning dependent on this. The tuberculin may cause a serious fall in blood pressure, leading even to a fatal issue; in other cases there have been congestion and hæmorrhage or other irritant effects have been produced.

Contra-indications for the injection are laryngo-tuberculosis, cardiac roubles, diabetes, nephritis and pregnancy. In epilepsy and neurasthenia hould be given with the greatest caution.

The general reaction usually sets in about 8 to 16 hours after the injection —more or less severe attack of shivering, with headache and pains in the limbs.

At the point of injection, redness appears after 1 to 2 hours, and gradually an infiltration shows itself varying in size from that of a farthing to that of alf-a-crown, the absorption of which may take several days.

The height of the reaction is indicated by a profuse outbreak of sweating, a lessening of all the other symptoms and a more or less speedy return of the emperature to normal. Generally the entire reaction is over in 24 to 36 hours. There may be slight lassitude, and in the case of phthisis an increased xpectoration, disappearing in a few days.

In lupus patients, besides the general reaction, a local reaction sets in— onsiderable reddening and swelling of the diseased parts.

Sequels to the injection of Tuberculin. E. Hoke states he has seen herpes oster, Quincke's œdema, periodontitis, urticaria, polyneuritis, fatal anaphylactic shock follow use of Old Tuberculin.—per Clin. Jl., Dec. 26/23,622.

TUBERCULOUS MENINGITIS treated with daily intrathecal injections of 1–3 Mgr. of Old Tuberculin (T.A.) suspended in cerebro-spinal fluid by lumbar puncture.—C. Worster-Drought, M.P.C., June 14/22,514.

GENITO-URINARY TUBERCULOSIS: massive doses of P.T.O.; P.T. and Old T. to 1·5 Cc.—R. Creasy, L. i./20,542. *See also* B.M.J. i./27,491. (*Timid oses are futile.*)

Unguentum Tuberculin (Old):—Lupus vulgaris has been diagnosed and reated by use of Old Tuberculin Ointment—5% of Old Tuberculin in a basis of Soft Paraffin. This is well rubbed in for one to two minutes and is lso applied by means of a bandage to the affected area—the part being previously cleansed and crusts, if any, removed. On removal of the application, varying degrees of hyperæmia and swelling are seen in the actual lupus issue, with a moderate amount of hyperæmia with reddish papules extending one or two inches into the surrounding healthy skin (Moro reaction *q.v.*). After cleaning the surface, similar applications for treatment are made for the next three or four days, till the lesion closely resembles that produced by the application of a Salicylic Acid Plaster. This typical reaction only obtains in the actual disease and does not extend into the surrounding healthy skin. The pain produced may be considerable.

'T.O.A.,' *i.e.* **Tuberculin-Original Alt**, is a germ-free Tubercle Bacilli bouillon culture (*typus humanus*), resulting from filtering mature cultures. The proper name under the *Therap. Subs. Regns.*, 1927 for this is *Tuberculin Bouillon Filtrate* with or without the suffix T.O.A. or P.T.O., *i.e.*, from human or bovine source.

It has been used in the 'Dispensary Treatment,' *q.v.* Asthma and hay fever have been treated with it on empirical lines, *v.* p. 907.

Tuberculin A.F. (Albumose-Free). P.G. VI. *Dose* (Initial).—0.00001 Cc. in pyrexial cases; 0.0001 Cc. in apyrexial cases. Subsequent doses are determined from a study of the resulting reactions —constitutional, or general and focal. As a rule, reactions should be allowed to subside before a fresh injection is given.

A light amber coloured liquid, the product of the tubercle bacillus grown in a special culture medium free from albumosis and Peptones, evaporated to $\frac{1}{10}$ its volume and finally filtered. It may contain 0.5% Phenol and is standardised at Frankfurt-a.-M.

This preparation, as already indicated, may well replace Old Tuberculin. It is used as *diagnostic* subcutaneously by conjunctival, intracutaneous and percutaneous application.

For treatment it is employed subcutaneously where a fold of skin and under-lying tissues can be raised. Reactions obtained are thought to be specific, and anaphylactic symptoms are excluded in consequence of the absence of non-specific proteins.

'Tubercle Vaccines.'—The proper name under the *Therap. Subs. Regns.* 1927 for preparations made from the bacillary substance by growing the organism on artificial media. They are suspensions of the killed organisms or products derived from them :—

Tuberculin 'T.R.' (*of commerce*). **Human, Bovine and Mixed Types.**

Dose, initial (subcutaneous)—0.00001 to 0·0001 Cc. according as the case is pyrexial or not, rising gradually to 0·2 or even 1 Cc. Dilutions are made in 1 Cc., using 20% Glycerin as diluent.

N.B.—Doses should be stated in decimals and by no other method.

Although a stereotyped increase of dose is not advised the following scheme will be useful as a guide (reading downwards in each column) :—

0·00001	Cc.	0·0001	Cc.	0·001	Cc.	0·01	Cc.
0·00002	,,	0·0002	,,	0·002	,,	0·02	,,
0·00003	,,	0·0003	,,	0·003	,,	0·03	,,
0·00004	,,	0·0004	,,	0·004	,,	0·04	,,
0·00005	,,	0·0005	,,	0·005	,,	0·05	,,
0·00006	,,	0·0006	,,	0·006	,,	0·06	,,
0·00008	,,	0·0008	,,	0·008	,	0·08	,,
						0·1	,,
						0·2	,,

As a rule weekly injections are given.

Several commercial preparations made on the lines of Koch's directions for T.R. are available.

'T.R.' of Koch contained *2 mgr.* of solid substance, *not* 10 mgr. as originally stated. An *enormous* amount of confusion was caused by this and indeed by the use of mgr. basis of dose at all. It may be recalled therefore that :—

0·00001 ($\frac{1}{100000}$) Cc. of 'T.R.' = 0·00002 ($\frac{1}{50000}$) mgr. (or 0·00000002 Gm.) of solid substance.

'Bold' Dose.—The large doses advised by Koch, starting from 0·0002 Cc. and repeated every second day with moderate increase of dose so that a rise of temperature greater than 0·9° F. was avoided—are not now generally administered.

The *English School* start with smaller initial dose (as already outlined) and do not look for any marked rises in temperature.

Tuberculin preparations per os. Tuberculin T.R. was given by some workers *per os* with immunising response.

The German **'P.T.R.'** indicated Bovine T.R. (P stands for Perlsucht = Pearl disease *i.e.* tuberculosis of serous membrane of cattle producing pearly nodules or tumours, often pendulous).

A very extensive discussion has taken place on what may be called Cross-Vaccination—*i.e.*, as to whether Human or Bovine Type of Tuberculin is to be used in a specific case. The problems as to the relation between human and bovine types are *sub judice.*

Tuberculin Bacillary Emulsion, 'B.E.' (*of commerce*) (Human Type, Bovine Type, or the two mixed are available).—*Dose.*—0.00001 to 0.00002 Cc. as a rule to begin with. For further details see below.

As proof of the immunising properties of his "T.R." and other preparations Koch demonstrated the production of specific immunising bodies which he called *Agglutinins.* The difference between 'B.E.' and 'T.R.' is that B.E. contains the *entire body substance of Tubercle Bacilli* whilst with T.R. the *soluble constituents* of the Bacillus are first rejected. The soluble Endotoxins are thought to play an important part in the production of Agglutinins and are contained in 'B.E.'

'B.E.' is, therefore, a suspension of entire pulverised Tubercle Bacilli in a mixture of equal parts Glycerin and Water. 1 Cc. contains 5 mgr. of thoroughly dried Tubercle Bacilli.

The dose is increased carefully at a rate which causes little or no rise in temperature (1° F.) and with intervals of about 1 week. With the small initial dose stated it is very exceptional for any reaction to appear. Should a rise occur, the dose should not be exceeded and temperature must have reached its previous level.

Table for conversion of Doses of 'B.E.' Human or Bovine, or mixed Human and Bovine, into 'Bacillary Substance.'

0·00001	(1/100,000)	Cc.	=	0·00005	(1/20,000)	Mgr.	**Bacillary Substance.**
0·00002	(1/50,000)	Cc.	=	0·0001	(1/10,000)	Mgr.	,,
0·00003	(3/100,000)	Cc.	=	0·00015	(3/20,000)	Mgr.	,,
0·00004	(1/25,000)	Cc.	=	0·0002	(1/5,000)	Mgr.	,,
0·00005	(1/20,000)	Cc.	=	0·00025	(1/4,000)	Mgr.	,,
0·00006	(3/50,000)	Cc.	=	0·0003	(3/10,000)	Mgr.	,,
0·00008	(1/12,500)	Cc.	=	0·0004	(1/2,500)	Mgr.	,,
0·0001	(1/10,000)	Cc.	=	0·0005	(1/2,000)	Mgr.	,,
0·0002	(1/5,000)	Cc.	=	0·001	(1/1,000)	Mgr.	,,
0·0003	(3/10,000)	Cc.	=	0·0015	(3/2,000)	Mgr.	,,
0·0004	(1/2,500)	Cc.	=	0·002	(1/500)	Mgr.	,,
0·0005	(1/2,000)	Cc.	=	0·0025	(1/400)	Mgr.	,,
0·0006	(3/5,000)	Cc.	=	0·003	(3/1,000)	Mgr.	,,
0·0008	(1/1,250)	Cc.	=	0·004	(1/250)	Mgr.	,,
0·001	(1/1,000)	Cc.	=	0·005	(1/200)	Mgr.	,,
0·002	(1/500)	Cc.	=	0·01	(1/100)	Mgr.	,,
0·003	(3/1,000)	Cc.	=	0·015	(3/200)	Mgr.	,,
0·004	(1/250)	Cc.	=	0·02	(1/50)	Mgr.	,,
0·006	(3/500)	Cc.	=	0·03	(3/100)	Mgr.	,,
0·008	(1/125)	Cc.	=	0·04	(1/25)	Mgr.	,,
0·01	(1/100)	Cc.	=	0·05	(1/20)	Mgr.	,,
0·02	(1/50)	Cc.	=	0·1	(1/10)	Mgr.	,,
0·04	(1/25)	Cc.	=	0·2	(1/5)	Mgr.	,,

To convert the above 'Bacillary Substance' stated in decimal part of a milligramme into decimal part of a Gm., carry the decimal point three places to the left. Thus 0·00005 Mgr.=0·00000005 Gm.

Dilutions are best made with 0·8% Sodium Chloride and 0·5% Phenol. A 1% Dilution of the original is sometimes called "Dilution No. 1," a 0·1% is No. 2 and so on. Not used as a diagnostic.

Bold Dosage (*cf.*, p. 939), was advocated by the German school. Starting with the same initial dose (0·00001 to 0·00002 Cc.), at one or two days' interval, the dose was rapidly increased from twice to five times the dose at each injection, until definite reaction appears with a rise of 2½ to 5° F. in temperature. As soon as such violent reaction develops much longer pauses, 6—8 days, were made. The injections were increased to 4 Cc. undiluted B.E. Koch regarded the immunisation as complete only when the patient could tolerate this without reaction The larger doses of 2 to 4 Cc. were only injected at intervals of 2 to 4 weeks.

In exceptional cases (***English dosage***) the initial dose may be as minute as 1/1,000,000 mgr. bacillary substance with gradual rise —the limit being—1/500 mgr. Bacillary substance (=0·0004 Cc.). *Average doses* are respectively 1/20,000 mgr. (=0·00001 Cc.), 1/5.000 mgr. and 1/2,000 mgr. diluted in 1 Cc.

Tuberculosis treated by Insufflation of bacillary emulsion of dead tubercle bacilli, 1/5000 to 1/40 mgm. 3 times a week—results encouraging.—O.F. Paget, per Clin. Jl., April 18/23,192.

Tuberculosis Immunising Vaccine (Nathan Raw). *Syn.* **Tubercle Vaccine 'R.'** N. Raw states that virulent tubercle bacilli—after years of subculturing—can be attenuated. The present cultures (subcultured monthly) represent the 216th generation—still true to type, but even when injected in large quantities into animals they are non-tuberculogenic and avirulent.—B.M.J., i./25,741. In his opinion this remedy should be of greatest value, not only in curing the disease, but also in its prevention, by protecting the human body against attack. Cattle can be rendered immune to virulent bovine bacilli by previous inoculation with virulent human bacilli. There is a marked antagonism in the human body between human and bovine infections. These two organisms cannot flourish in the body at the same time.

Extended clinical investigation at Liverpool showed that the human body is attacked by two quite distinct forms of tubercle—the one conveyed by direct infection and attacking chiefly the lungs (so-called consumption); the other, the surgical form, conveyed by milk from tuberculous cows and developed in the first few years of life. A vaccine made from bovine cultures should be used in the treatment of human infections and *vice versa.*

Raw's Vaccine is a bacillary emulsion of the bacilli containing all the products of the bacillus. It is non-toxic and avirulent, and produces no reaction even in large dose.

Dose recommended.—0·001, 0·002, 0·003, 0·004, 0·005 and 0·006 mgr. for immunising susceptible children at weekly intervals, repeated in three months.

For *treatment* of the active disease, commence with 0·001 and increase to a maximum of 0·025 mgr. Twelve injections should be given at intervals of seven days. Vaccine should be freshly made. Results in suitable cases excellent.—N. Raw, B.M.J. i./21,595, L. i./21,693. *See also* B.M.J., i./25,741 and L. i./21,1305.

Results of treating 88 cases of tuberculosis with N. Raw's Vaccine during 12 months. A specific remedy does not yet exist which will effectively destroy tubercle bacilli in the body. The use of cultures of very low virulence is of prime importance. The growths employed in making this vaccine, subcultured every month for 15 years (184th generation), are quite non-tuberculigenic and completely non-pathogenic to animals.—N. Raw, Pr., Apl. 22/229.

Tuberculosis Immunity. Every person receiving a mild tuberculous infection is immunised, either partially or completely, for some time (probably not more than a year). In civilised communities nearly all adults have been infected, infection occurring in most cases during childhood. This infection endows the organism with heightened resistance against infection with tubercle bacilli. The immunity thus produced is usually sufficient to protect them against reinfection during the rest of life, but when this immunity fails new tuberculous foci develop. A very small amount of vaccine prepared from cultures of tubercle is sufficient to produce immunity for a limited time, and this should be used as a prophylactic measure in children who have been exposed to infection. In the treatment of clinical tuberculosis an immunising vaccine has given excellent results. By directly counteracting the toxic effects of the bacilli within the body, temporary immunity is induced, allowing the affected organs time to recover. As a result of the treatment of over 3,000 cases of tuberculosis with every preparation of Tuberculin, the author is convinced that a vaccine prepared from an attenuated and non-pathogenic culture, free from all toxins, gives far the best results.—Nathan Raw, Pr., Nov. 23, 317.

Dreyer's Tuberculosis Vaccine. *Syn.* ✱**Daccol** (T.M. 400418), **'Defatted' or 'Diaplyte' Tubercle Vaccine.**

In making this vaccine, the bacilli from a glycerin broth culture, are treated with formalin and then defatted with Acetone; they are finally ground up with saline and centrifugalised. The supernatant fluid is pipetted off and, when diluted with saline containing formalin, constitutes the defatted antigen suspension.—Georges Dreyer, B.M.J. i./23,1059,1065.

Dose.—The Vaccine is made in four dilutions, containing respectively 1/10,000 mgr. of the dried "defatted" bacilli per Cc.: 1/2,000: 1/250 mgr. per Cc., and 1/50 mgr. per Cc. 5 Cc. of the weakest (Green Label) are advised first, commencing with 1/10 Cc. An interval of 4 to 5 days should intervene between successive doses. Each succeeding dose should be double the preceding, so long as no undesirable reaction results. In the event of reaction, the interval before the next dose should be prolonged for 2 or 3 days and the dose should be slightly reduced. When the first 5 Cc. (Green Label) have been given, the next dilution (Black Label) should be proceeded with, commencing with an initial dose of 1/10 Cc., and doubling the doses or only slightly increasing them as the symptoms may indicate; and then the third dilution (Blue Label). The fourth, strongest dilution (Red Label) is also commenced with 1/10 Cc. The interval can now be increased to 5 or 6 days or more, depending upon the patient's condition. Avoid sudden increases in dose. The initial dose recommended is safe even in febrile cases.

The Medical Research Council arranged extensive trials.—L. i./23,1321.

Criticism of Dreyer's names.—J. A. Shaw-Mackenzie, B.M.J., ii./'23,263.

Weekly doses of 0·5 Cc. of diaplyte tubercle vaccine, derived from a strain of tubercle bacilli other than that employed by Dreyer, whether used as an immunising or curative agent, is of no avail for combating guinea pigs' tuberculosis resulting from infection with living bacilli of the same strain as that used for the preparation of the diaplyte vaccine.—Jl. Path. and Bact. (Edin.) Oct. '25. Per Jl. A.M.A. ii./25,1996. *See also* Douglas, Jl. Path. and Bact. Oct. '25,633. Pres. Aug. '26,301.

Sir James Fowler states that, generally speaking, opinion is not favourable. Before clinical use is made of a remedy, overwhelming proof should first be produced that it confers immunity on animals. The Lister Institute Report (1923) shows that there is no such result with Dreyer's Vaccine.—L. i./25,1236.

General References to Use of Tuberculins.

There is grave danger in giving Tuberculin in phthisis whilst patients are walking about and pursuing their avocations. Tuberculin causes hyperæmia and the more hyperæmic the lesions the more easily will a dangerous autoinoculation be induced by exercise. It is true that cure may be through autoinoculations, but if autoinoculations be allowed to become excessive through Tuberculin and exercise combined, then the disease will inevitably continue. With regard to *length of time* that it *is necessary to continue treatment*:—(1) Patient should be able to take $\frac{1}{5000}$ mgr. 'T.R.' without any effect noticeable either in temperature or index. (2) After sufficient exercise to cause exhaustion there should be no sign of an autoinoculation, *i.e.*, the *Opsonic Index should not fluctuate.*—B.M.J. i./11,132.

With the use of Tuberculin at the King Edward VII. Sanatorium the number of patients who lost their Tubercle Bacilli increased by 17% over what was obtained merely by Sanatorium treatment.—L i./13,965.

In tuberculosis of the iris a patient with a hectic temperature received a small dose of 'T.R.' after the temperature had been brought to normal by rest in bed. The result was disastrous and hastened the inevitable loss of both eyes. Focal reaction in eye cases always does harm.—T. H. Butler, B.M.J. ii./13,980. *See* also S. Stephenson, L. ii./13,1530.

Fever in pulmonary tuberculosis. B.E. in preference for treatment. The dose must be extremely small, 1/100,000 mgr. initially. Its use in some cases produces an immunising effect sufficiently strong to turn an unfavourable course into a more favourable one.—F. J. Wethered, L. ii./13,1046.

For and Against Tuberculin.

H. Batty Shaw says, if it were proved that tuberculous cattle could be cured by vaccination with Tuberculin its use would be widespread in veterinary practice, and its employment would be general in man, but the reports as to cattle do not exist.

He admits that the success with Antityphoid inoculation when brought to bear on Tuberculin treatment is a difficult argument to combat. The advocates of Tuberculin treatment of *established* tuberculosis, or for Vaccine treatment of any *established* infection, feel that if typhoid fever can be reduced in case incidence and in case mortality by vaccination before the disease is developed, it should be able to be controlled by vaccination after the disease is developed. Figures have yet to be published to prove this speculation. Antityphoid amboceptors developed in a healthy individual before he contracts typhoid are ready to digest the bacilli as they arrive. If Tubercle Bacilli, on the other hand, gain access to the body they surround themselves with an almost impenetrable ring of fibrous tissue, caseous or calcified material, then any subsequent development at a remote part, *e.g.*, of the skin or subdermic tissues, of 'sessile' tuberculin or tuberculo-amboceptors by means of injections of Tuberculin or Tubercle Bacilli, may be quite unable to reach the Tubercle Bacilli.—B.M.J. i./13,921. J. W. Allan supports this and enquiries as to decided and cumulative effect on the pulmonary lesions.—*ibid.* p. 1140.

Sir F. C. Eve's reply to the above was that observation by the clinician is more reliable than theories. He suggested that the experiments must be continued on a larger scale, which he believed would reverse the Author's opinions. He said, if clinicians find as a matter of fact (as he did) that Tuberculin does a large amount of good, it becomes the duty of theorists and experimentalists to modify theory and find the reason of the discrepancy in the animal experiments.—B.M.J. ii./13,47.

The ideal Tuberculin has not yet been found and the method of its action on healthy and unhealthy cells respectively has not been satisfactorily worked out. *In spite of all research the treatment of any individual case must be more or less of a leap in the dark.*—Editorial, B.M.J. ii./13,1243.

Tuberculin in certain cases acts 'like a charm,' in others it does little or no good, and in others again does actual harm. Fibrosis is an important element in Tuberculin therapy, and the less fibrosis the more satisfactory the results with Tuberculin. Hypersensitiveness is no contra-indication. Except in cases of asthma, much improvement with Tuberculin cannot be expected in 'subsensitive' cases (*e.g.* those which react to a 1 in 10 dilution of Old Tuberculin).—F. E. Gunter, B.M.J. i./24,1049.

Experimental Tuberculin treatment with guinea-pigs ineffective and harmful. L. S. P. Davidson, L. i./25,13.

Tuberculosis in the Tropics. No good result seen following Tuberculin, and in many cases chance of recovery destroyed.—Sir James Fowler, L. i./25,1236.

Evidence to show that Tuberculin is specific both in diagnosis and in treatment.—F. G. Griffiths, B.M.J. i./27,827, *ibid.* 897.

The active principle of Tuberculin is non-dialysable, is not absorbed by animal Charcoal, is destroyed by Trypsin, is maximally but incompletely precipitated by Acetic Acid at pH. 4·0, and is completely precipitated by saturation with Ammonium Sulphate. The product thus precipitated can be divided into three protein fractions: (1) a water-soluble heat-coagulable protein; (2) a non-coagulable, alkali-soluble, water-insoluble protein, and (3) a non-coagulable, water-soluble protein. The first and third of these appear the most potent.—E. R. Long and F. B. Siebert, Jl. A.M.A. ii./25,652.

Graduated Labour Treatment—'AUTOINOCULATION.' Curative effects are produced in quite early pulmonary tuberculosis by means of artificial auto-inoculations by allowing the patient to take *sufficient* exercise.

It has been criticised as largely a hypothetical process. Rise in temperature as result of exercise, occurs in normal persons. It may be the tuberculous person's temperature rises more readily than that of the healthy man. Work is no more a specific for consumption than rest or Cod Liver Oil.

Combined type of tuberculins plus B. Coli found capable, especially in tubercular disease of the bones, but certainly, if judiciously given, in any tubercular disease—of giving extraordinary sense of well-being and comfort with, as a rule, improvement in appetite.—R. Robertson, Pres., Feb., '20.

Tuberculin treatment. Focal reaction important. Dose should be regulated so that 'lumps' at the seat of injection do not form. One must find the tuberculous content of the patient before the disease can be attacked successfully.—R. Robertson, Pr., May 22/354.

Living attenuated tubercle bacillus 0·1 to 2 mgr. used in treatment of tuberculosis without ill effect. 'Vital-tuberculin'—crushed tubercle bacilli—also used.—B.M.J.E. ii./21,9.

Opsonic Index. For a note on this factor see *Vol. II.*

TUBERCULIN DISPENSARY TREATMENT.—W. Camac Wilkinson read a paper at the B.M.A. Meeting 1910. He reviewed the contraindications usually accepted and pointed out that Tuberculin acted like magic in cases of hæmorrhage, apart from complications. Hæmorrhage might be the first sign of a mixed infection, in which case Tuberculin would be contra-indicated, but by the mixed infection, not by the hæmorrhage. In his view Tuberculin treatment is analogous with the use of Haffkine's Fluid or similar agents in plague, cholera or typhoid. Tuberculin never failed when Sanatorium methods succeeded. In the first stage pulmonary tuberculosis could be cured with certainty by Tuberculin, in the second permanent results are obtained in 40 to 60% of cases. A further paper dealing with laryngeal tuberculosis; some remarkable results are described. Only early or suspected cases are suitable for this form of—Dispensary—treatment. The treatment should be refused to all presenting evidence of mixed infection. Tuberculin Dispensaries established in various places—Aldershot, Street (Somerset), Irvine, and others proposed both for treatment and diagnosis in case of contacts.—(Leader) B.M.J. i./11,265.

From a study of his papers his usual treatment is *first a course of 'P.T.O.,' then 'P.T.' (may be repeated courses), then Tuberculin Old—or more recently Tuberculin 'A.F.'*

"*The dosage (at the Portsmouth Municipal Tuberculin Dispensary) is approximately as follows:—First dose of 'P.T.O.' is from* 0·00025 *to* 0·005 *Cc.—increased gradually to* 0·5 *or* 1 *Cc. When this has been reached without reaction (over* 100° *F.) P.T. (which is said to be* 40 *to* 50 *times as powerful as P.T.O.) is given, i.e., after* 0·5 *Cc. of 'P.T.O.' the usual dose of 'P.T.' will be* 0·01 *Cc. until* 0·5 *to* 1 *Cc. is taken without reaction, when a short course of Old Tuberculin with a maximum of* 0·5 *to* 1 *Cc. is injected.*"

In support of large doses of Tuberculin subcutaneously.—W. Camac Wilkinson, B.M.J. i./23,675.

Regarding **Municipal Tuberculin Dispensary Treatment,** we provided a number of abstracts of the literature in our 17th Edn., p. 895.

Pulmonary tuberculosis treated with Tuberculin. Method of Camac Wilkinson used as above outlined. In all about 40 injections were given, lasting over a period of six months; good results obtained.—W. Stobie, B.M.J. ii./22,473.

In a criticism of C. Wilkinson's book, 'The Principles of Immunity in Tuberculosis,' it is asked, 'If tuberculin is of such high value, why, after so many years, is it so little used; or, rather, why is it feared and condemned?"—B.M.J. i./26,1039.

Tuberculin "offers a certain cure in 90% of early cases." Four essential points: (i.) Not to be given when patient has intermittent or continuous pyrexia. (ii.) Dose to be given twice a week. (iii.) Persistence until large doses are reached. (iv.) Temperature taken four times a day. Recommends beginning with P.T.O. 0·0005 Cc. gradually increased to 1 Cc., then P.T. 0·005 Cc. increased to 1 Cc., then Old T. 0·05 Cc. increased to 1 Cc. After a reaction, *i.e.*, either general (rise in temperature, nausea and perhaps vomiting) local, or focal at site of tubercular disease, no further doses should be given for one week. Then, unless the reaction is unusually severe, the same dose should be given. In a few very sensitive cases it may be necessary to begin with as little as 0·0000002 Cc. T.A.F. Minimum time for first course, five months.—Rolf Creasy, Jun., M.P.C., Jany. 24,23,66

Prophylactic vaccination of the newly-born against tuberculosis.

'B.C.G.' (**Bacille Calmette-Guérin**), a strain of tubercle bacillus grown on glycerinated Ox Bile, first described by Calmette in 1909, was subcultured 230 times up to January, 1921, when vaccination experiments were started, and was then incapable of producing tubercles. Caused a general disease in calves resembling typhoid fever, clearing spontaneously after 15—20 days without producing slightest tubercle formation. 'B.C.G.' now cultivated on potato and glycerinated veal broth or Sauton's Asparagin medium: cultures must not be more than 10 days old. Administered in milk at body temperature in three doses and harmless even in new-born infants. Up to end of 1925, 1317 new-born infants treated (of which 586 had been in contact with tuberculous cases). Of this number, 10 died of tuberculosis by end of first six months. Final judgment cannot yet be given.—L. ii./26,1046.

None of the children vaccinated in 1922 (and left exposed to contamination) with Calmette's B.C.G. bacillus vaccine have died, and only 0·5% of those vaccinated in 1924 have died from presumed tuberculosis. It has proved entirely harmless for all infants vaccinated more than three years ago.—Presse Medicale, per Jl. A.M.A. ii./25,474.

Of 882 cases reported on from one to two years after vaccination there were 7 deaths from tuberculosis and 72 from other diseases, and of 87 reported on more than two years after vaccination there were no deaths from tuberculosis. The conclusion is that mortality from tuberculosis among vaccinated cases is 0·8 per 100 living and from all cases 8·9 per 100 as compared with 26 per 100 in the same age group of children born of tuberculous parents or living in tuberculous environment.—L. i./27,936.

Vaccination against tuberculosis (Calmette Vaccine).—B.M.J. i./26,581. *See also* L. i./25,1353.

Statistics show a striking difference in the tuberculosis mortality in France existing between infants who have been vaccinated by the method of Prof. Calmette and those not so vaccinated. The procedure is to give 3 doses, each of 10 mgr. of a non-virulent strain of tubercle bacilli during the first 10 days of life, and the figures represent the mortality calculated on each of the first two years of life.—Leader, B.M.J. i./27,845. *See also ibid.* 897, 1082, in which limitations in the value of the statistics is expressed by M. Greenwood.

The following additional (unclassified) preparations are used in treatment:—

I.K. (Immune Körper) Tuberculin.—*Syn.* Spengler's Tuberculin manufactured at Davos (Switzerland).

The preparation is stated to have an antitoxic action, neutralising the poison of the bacillus and a lytic action which impairs or destroys the vitality of the bacteria. It contains besides immune bodies against the T.B. and other organisms associated with it.

Dose.—1 Cc. of 1 in 10 million dilution of the preparation gradually increased (to 1 in 1 million, 1 in 100,000, etc.), to 1 Cc. of the preparation; the diluting fluid being sodium chloride 0·5 Gm.; Phenol 0·5 Gm., Distilled water to 100 Cc.

According to Spengler the red blood corpuscles (not the serum) are the site of production and collection of the protective substances in a number of infectious diseases, *e.g.*, in tuberculosis. This suggested the use of tubercle-immune blood obtained from rabbits immunised against strains of human tubercle bacilli. A vein of the animal is punctured and the blood received into Carbolised Saline Solution containing Lactic Acid. The treatment is, therefore, a 'passive-active' immunisation. See also Treatment of Tuberculosis by W. H. Fearis (John Murray) and L. i./12,194.

Laryngeal Tuberculosis treated with various Tuberculins including 'I.K.,' 'P.T.O.' and Old Tuberculin, with remarkable results.—W. Camac Wilkinson.—B.M.J. ii./10,1705, *cf.* Tuberculin Dispensaries.

Beraneck's Tuberculin consists of a mixture of tubercle-broth filtered free from bacilli and concentrated *in vacuo*, with an extract of the bacilli made with phosphoric acid. It is stated to contain exotoxins and endotoxins and acts like a vaccine, strengthening the bacteriolytic power of the protective cells; it also exercises a bactericidal or attenuating effect on the Tubercle Bacillus.

It is supplied in 6 dilutions, $T.Bk_1$ to $T.Bk_6$, *viz.*, 1 : 10 to 1 : 1,000,000 for use.

Spahlinger's Serum.

In Spahlinger's 'passive immunisation' the various toxins serve for preparation of three types of 'partial' sera. These together constitute his anti-tuberculosis serum.—L. i./22,5. See also strong criticism.—S. Lyle Cummins, *ibid.* 98.

Offers from this country to assist him financially if scientific proof for his claims is available.—B.M.J. i./23,831.

Spahlinger's work—criticisms.—B.M.J. i./23,938.

Earlier references; L. i./21,397,448. Secrecy regarding.—Addison, *ibid.* 563.

Of 10 cases of tuberculosis treated at St. George's Hospital during the period November, 1913 to August, 1914 by Mr. Spahlinger, 7 are now dead. None showed marked improvement. Case histories given.—Thomas Nelson, L. i./27,16–18. Detailed criticism of paper by H. Spahlinger and further reply by T. Nelson.—L. i./27,254-258.

Lundie's Tuberculin. Made by using Phosphorus Trichloride to dissociate the acid-fast substance from its union with other constituents of the bacillus. Acetone is used to precipitate the bacilli along with phosphorised fats. This precipitate is the basis of the Tuberculin. A short account of clinical use is given.—B.M.J. i./25,405,764.

A new Tuberculin. Cultivation on blood serum unsterilised by heat so as to simulate conditions in the human body, and the inclusion of part of the filtrate in successive cultures.—H. Hyslop Thomson, B.M.J. ii./26,587.

TUBERCULIN REACTIONS FOR DIAGNOSIS.

Subcutaneous test.

The test in the human being (*not usually considered safe*).

An initial dose of 0·2 Cc. of a 1 in a 1,000 dilution of old tuberculin is injected subcutaneously. If no rise of temperature follows, give 1 Cc. of a 1 in a 1,000 dilution at least 48 hours later. If again no rise of temperature occurs give 0·5 Cc. of a 1 in a 100 dilution. Finally, if necessary, 1 Cc. of a 1 in a 100 dilution. A rise of 2·3° F. or more occurs in tuberculous subjects, some 6 or more hours after the injection of tuberculin.

The test for veterinary use.

The animal is confined to its stall for 24 hours before the injection is made and its temperature observed. 3 to 4 Cc. of a 1 in 10 dilution are injected subcutaneously in the neck. The temperature is taken 6, 9, 12, 15, 18, 24 and 36 hours after inoculation. If there is a rise of temperature of 1·4° C. or more the animal should be regarded as tuberculous. With a rise of temperature from 0·8—1·4° C. the diagnosis is doubtful and the test should be repeated after one month.

N.B.—This test has been proved to be of the utmost value for the diagnosis of tubercular infection in cattle. Occasionally in animals with advanced infection the test is negative. In these cases, however, the diagnosis can usually be arrived at by other means. In a few cases, in animals suffering from echinococcus infection a slight positive reaction has been obtained.

After a dose of Tuberculin in cattle, a further dose during six months may fail to again produce a rise in temperature.

Tuberculin Tests of Cows. Unless test be carried out with most scrupulous care doubtful results are numerous.—Capt. S. R. Douglas, L. ii./22,929.

As diagnostic, stated to be reliable. Tubercle can be stamped out from ur herds.—Prof. S. H. Gaiger, B.M.J. ii./22,961. Further refs. Edn. XVIII.

Tuberculin Committee's Report.

Tuberculin Tests in cattle. Subcutaneous test unsatisfactory under farm conditions, and ophthalmic test only be regarded as subsidiary. Complete confidence in intradermal test.—B.M.J. i./25,797.

Cutaneous test (von Pirquet). Cleanse the inner side of the forearm with ether and alcohol. Make two similar scratches with a sterile needle 3 inches apart (avoid drawing blood). On one scratch, place a drop of 1 in 4 old tuberculin in sterile water (pure old tuberculin is sometimes used), keep the other scratch as a control. Examine at 12, 24 and 36 hours. A positive reaction occurs in from 3–24 hours and is usually at its height at 36–48 hours. The skin becomes red and slightly raised on each side of the scratch over an area 10 mm. broad, reactions under 5 mm. should be regarded as doubtful.

Constitutional reactions following cutaneous Tuberculin Tests.—Am. Rev. Tub., Sept. '25, per Jl. A.M.A. ii./25,1583.

A delicate indicator of tuberculous infection in childhood.—It does not fail even in massive tuberculous disease.—C. McNeil, B.M.J. i./23,673.

A suggested modification, the multi-papillary cutaneous (M.P.C.) method, consists in placing 1 m. of each Tuberculin dilution on the forearm and then, using a sharp vaccinating lancet, a quick movement is made through the drop and superficial layer of epidermis about ¼″ long. The essential point is that the bleeding layer must be penetrated, whereas von Pirquet says 'blood should not be drawn.' The scratches (at least 5) are covered with absorbent wool retained for two days.—H. A. Ellis, L. ii./16,Oct. 7.

Intradermic test (Mantoux). Intradermic injections of 0·1 Cc. are made into the cleansed forearm of:—

1. Normal saline (the same as is used for diluting the tuberculin).
2. 1 in 10,000,000 old tuberculin in normal saline.
3. 1 in 1,000,000 ,, ,, ,,
4. 1 in 100,000 ,, ,, ,,
5. 1 in 10,000 ,, ,, ,,

A positive reaction appears in 6–8 hours, maximum 24–48 hours, subsides 6–10 days.

The skin at the site of inoculation becomes infiltrated and hyperæmic in severe reactions vesiculation occurs. (Routine tests may be made with No. 1 and 4 only).

Percutaneous test (Moro). An ointment made of lanolin and old tuberculin in equal parts is rubbed on to the skin of the chest. A positive reaction is shown by the development of reddening and papules.

Ophthalmic test (Calmette). This test has been given up owing to the occurrence of severe accidents. A 2% solution of a specially prepared tuberculin is dropped on to the conjunctiva. A positive reaction is shown by the appearance of reddening of the inner canthus caruncle or even the entire conjunctiva, often accompanied by swelling of the lids. The tuberculin employed s prepared by precipitating old tuberculin with absolute alcohol and suspending the deposit in normal saline.

Tuberculin Ointment (for percutaneous use—Philip). Tuberculin Original Koch 10 to 50, Eucalyptol 5, Eucerin to 100; Beraneck's Tuberculin s also suggested.

Percutaneous exhibition of Tuberculin exerts a remarkable influence on the first buddings of tuberculosis in childhood. Continued observations, over long periods, show it is capable of effecting the nearest approach to *de*tuberculisation yet realised. Used as diagnostic and therapeutic agent, the twofold aspect must be kept steadily in view. The local stimulation by Tuberculin at each tuberculous focus is an important step. When Tuberculin is rubbed firmly into the skin of a tuberculous patient it is freely absorbed and exerts a specific curative influence. Generally, a 25% preparation is convenient In young subjects, or where there is doubt as to the number and extent of foc involved, begin with 10%. The actual amount of Tuberculin used in a straightforward case (using, say, 25% dilution) may be approximately 0·1 Cc. The ointment containing this quantity is rubbed (worked) into the cleansed skin over an area of 1 or 2 square inches, by means of a small glass rod. Repeat once weekly.—Sir Robert Philip, B.M.J. i./23,493.

Tuberculin Old or P.T.O., or equal parts of both, mixed with Compound Camphor Liniment in proportion of 1 to 5 minims to 1 drachm, used for local application, *e.g.* in abdominal disease or pulmonary tuberculosis. An ointment using Anhydrous Lanolin employed for lupus or adenitis.—J. Crocket B.M.J. i./22,679.

Patients treated by 0·01 Cc. T.A.F. diluted with a suitable quantity (*e.g.* 0·5 Cc.) of Compound Camphor Liniment rubbed into back of upper arm. If no reaction the dose is doubled at next sitting and doubling continued until 0·1 Cc. tuberculin is reached, after this the dose is increased with caution to 1 Cc. of tuberculin. Interesting to note that all cases of asthma reacted to 1 in 10 or 100, not one to 1 in 500. Tuberculin used as test to sensitiveness by von Pirquet's reaction, as modified by Ellis, initially.—F. E. Gunter, B.M.J. i./26,1083.

For the Serum Diagnosis of Tuberculosis see Vol. II.

Typhoid Fever, Anti-Typhoid Inoculation.

In the war each nation initially employed for immunising purposes preparations of the *B. Typhosus* alone without realising the importance of the Paratyphoid organisms.

The vaccine had to be amended to include the latter when the overwhelming preponderance of Paratyphoid infection was realised. Sir W. H. Willcox (L. i./16,454) for example in detailing his experience in the Dardenelles Area of a large number of cases, states that while Typhoid cases were 13·5%, Paratyphoid constituted 86·5%. The Paratyphoid on subdivision gave ‘A’ 47·5% of total, ‘B’ 29% and non-agglutinable Paratyphoid 10%. In fact the Paratyphoid cases were in his judgment considerably more than 6·4 times as numerous as the cases of typhoid. In normal times in the past paratyphoid has been a relatively uncommon disease. The virulence of the paratyphoid organisms is much lower than that of *B. Typhosus* or thousands of lives would have been thrown away.

The immunity created by prophylactic inoculation with ‘T.A.B.’ Vaccine remains at a high level for at least six months—probably for twelve, and should an inoculated person contract the disease, its severity is diminished and the percentage mortality lowered.

A single positive Widal Test is of no value, but a study of the agglutination curve for the several organisms was proved to be essential for correct diagnosis in cases which had been inoculated with ‘T.A.B.’

An outbreak of Paratyphoid ‘B’ conveyed by ice-cream. 63 cases at Norwich, June, 1926.—V. F. Soothill and G. L. Leggat, L. i./27,1233.

The *case incidence for 1926* was 2,739, as compared with 2,779 in 1925, 4,121 in 1924, and 3,211 in 1923.—Sir George Newman's Report for 1926, B.M.J. ii./27,458.

Immunity in Orientals. The nervous system of Orientals is much more resistant to the effects of germ infection than that of Occidentals. Specific immunity to typhoid demonstrated in 15·5% of the people. Racial immunity acquired as a result of continued use of infected water and food supply.—R. W. Mendelson, per Jl. Trop. Med., June 15/23,219.

Anti-Typhoid-Paratyphoid Vaccine (T.A.B.) (*Therap. Subs. Regns.* 1927 *name*) is made from cultures of Typhoid and Paratyphoid 'A' and 'B' organisms, ampoules containing 500, 1000 and 2000 millions of each organism.

For immunising.—These doses are given in series at intervals of not less than 7 days; the interval of 10 days is to be preferred. An interval of 14 days is even better. (*Some give only the* 500 *and* 1000 *millions at* 10 *days in urgency.*) The dose is given *subcutaneously* into the tissues of the upper arm just below the insertion of the deltoid.

For children the dose may be on the lines of Gaubius' Dose Table. Thus a child of 7 would receive 1/3 average dose.

According to a report to the Medical Research Committee by G. Dreyer, A. Duncan Gardner, A. G. Gibson and E. W. Ainley Walker —(see L. i./18,498)—on Prophylactic Typhoid plus Paratyphoid inoculation (T.A.B. vaccine) 1000 million Typhoid and 750 million each 'A' and 'B' per Cc. should be given in doses of 0·5 and 1 Cc. as first and second dose to ensure protection. The interval between the first and second should be lengthened from 10 days to 18 or 20 days.

Technique.—Rub the area with antiseptic solution. A good fold of skin and underlying subcutaneous tissues is lifted firmly between the left thumb and forefinger and the needle plunged boldly and quickly to the depth of *about an inch,* the tissues released and the injection given slowly into the tissues. The puncture may be touched with weak antiseptic or dried and a little collodion applied.

The patient should take no alcohol whatever during the 24 hours preceding and after the injection.

Contraindications.—Alcoholics react more strongly than others. Kidney disease requires caution and there is possibly slight risk in the case of old standing tuberculosis.

Effects.—Tenderness at the place of inoculation is at its worst in about 18 hours. Redness may be caused. Give free use to the arm the day after injection. Malaise begins in about 6 hours. Occasionally a rigor. There is usually headache and a slight degree of pyrexia. Occasionally temperature up to 101° F., rarely 103° F.

Anti-Typhoid Vaccine (plain) is also made. *Dose* 1000 million and 10 days later 2000 million.

Anti-Typhoid-Paratyphoid-Cholera Vaccine (T.A.B.C.) (*Therap. Subs. Regns.* 1927 *name*) *Syn.* CASTELLANI'S TETRA VACCINE.

No. 1.—One Cc. contains 500 million B. typhosus, 375 millions each B. paratyphosus 'A' and 'B', also 5000 million Cholera Vibrio.

No. 2.—Contains double quantities of No. 1 per Cc.

Dose.—1 Cc. of No. 1, followed by 1 Cc. of No. 2, after customary interval.

It is also made with M. Melitensis in place of the Cholera Vibrio ('T.A.B.M.').

Castellani's Pentavaccine is Typhoid + para-Typhoid 'A' + para-Typhoid 'B' + Cholera + Malta Fever.

Experiences with T.A.B.C. and T.A.M.B.C. in Serbia. Inoculated persons developed antibodies to the diseases named.—G. A. Lurie, B.M.J. i./16,45.

The same worker's **Hexavaccine**: Typhoid, 500 million, Paratyphoids "A" and "B" 250 million each, V. Cholera 2000 million, B. Pestis 500 million and M. Melitensis 2000 million per Cc.

(T.A.B.C.P.M.) with an initial dose 0·5 Cc. and double the amount a week later—is thought to be still in the experimental stage. This if found efficient would constitute the ideal vaccine for use in the tropics.—B.M.J. ii./17,357.

Combined preventive inoculation against typhoid, paratyphoid and bacillary dysentery. Dysentery vaccine completely sensitised with a heated polyvalent dysentery serum.—G. P. Johnson and A. J. Milne, B.M.J. i./16,88.

A new germ of Paratyphoid.—L. Hirschfeld, L. i./19, 296.

Triple typhoid vaccines made in the Laboratories of the Roy. Nav. Med. School, Greenwich, with results.—L. i./19,145.

Plain Anti-typhoid Vaccine and 'T.A.B.' are also used ***for treatment.***

Dose.—50, 100, 250, 500, 1000 and 2000 millions. An initial dose of not less than 250 millions can be safely used—these to be repeated or increased under guidance of the clinical signs and symptoms. It might be of value to give a vaccine of *B. Coli* and *Streptococci* to raise the immunity against these organisms before they can take an active part in the process of destruction of the tissues (as in the later stages of typhoid).

T.A.B. Vaccine of undoubted value in treatment of enterica; curtails pyrexia, limits toxæmia, and prevents complications.—M. L. Treston, I.M.G., Oct. '26,479.

Small doses of Anti-Typhoid Vaccine should be used at first, viz. 50 million, and gradually increased. Dose reduced with pulmonary complications, and treatment suspended on occurrence of intestinal hæmorrhage, also in hyperpyrexia, syncopal attacks, and much enlargement of spleen. Cardiac complications not contraindicated except during early stage.—B.M.J.E. i./26,43.

Intravenously Anti-Typhoid Vaccine found of value in the treatment of typhoid fever. Large initial doses must be avoided. A febrile reaction exceeding 40·5° C. is inadvisable. The initial dose should be about 120 mill. B. typhosus, gradually increased to 200 mill. if necessary. Perforation, severe hæmorrhage, severe myocardial degeneration and severe second infection are contraindications. Mild hæmorrhage, pneumonia, mild myocardial degeneration, meningeal symptoms and severe toxæmia are indications for use of smaller doses than usual.—K. D. Fairley, per Jl. Trop. Med., Dec. 15/23,368.

CLIMATIC BUBO cured by intravenous injection of killed Typhoid bacilli 100 million. If necessary repeat after 4 days with 150 million and even a third time with 300 million.—H. M. Hanschell, L. ii./26,276.

Internal Administration.

In an outbreak of typhoid in the Pas-de-Calais, vaccine was given to some 1,200 individuals in pill form. The results compared with a control group, in which ordinary prophylactic inoculation was carried out subcutaneously, showed encouraging results, pointing to an increased efficiency of Besredka's oral method. (Besredka claims that rabbits could be immunised against typhoid, paratyphoid, etc., by feeding with cultures of the organisms, after a preliminary treatment with bile).—J. Pratt Johnson, L. ii./22,753.

Anti-typhoid vaccine administered *per os* gave excellent results in an outbreak among natives employed in a gold mine near Germiston (S.A.). Doses consisted of 40,000 mill. (B. typhosus) given for 2 or 3 successive days.—A. J. Orenstein and J. H. Pirie, per Jl. Trop. Med., Sept. 15/23,292.

Massive infection with bacillus typhosus. A soldier while working in the laboratory of the 8th Corps Area, sucked 0·5 Cc. of a heavy culture suspension of B. typhosus through the cotton plug of the pipette. He had been vaccinated a year and two months previously with triple typhoid vaccine, but was at once given a further 0·5 Cc. of the vaccine in the hope of increasing his immunity. No symptoms appeared, except slight headache and weakness on eighth day after infection. A specimen of fæces taken on the 12th day showed B. typhosus to be present, but although closely watched no further symptoms of the disease appeared after that date.—B. C. Grant, Jl. Trop. Med., July 15/22,239.

Besredka was unable to produce typhoid by injection of living typhoid bacilli until he had previously given **Ox Bile.** This had the necessary effect on the mucous membrane and allowed the bacilli to pass through unaltered.—A. Latham, L. i./22,263. (*Cf.* under Tuberculosis and Local Immunity.)

Prophylactic typhoid vaccination of 850 subjects by the mouth. Nine developed typhoid fever from one to twelve months after vaccination. No be-effects.—per Jl. A.M.A. ii./25,1678.

A variation of Besredka's typhoid immunisation by oral administration of a vaccine is used by the S. African Institute for Medical Research, and thousands of natives have been vaccinated by this method, which consists in giving *per os* a liquid suspension of killed *B. typhosus* and *B. paratyphosus* 'A' and 'B,' and simultaneously ***a pill of Ox Bile.*** No unpleasant reaction or malaise is stated to follow and immunisation is supposed to be as efficacious as by the hypodermic method.—B.M.J. ii./27,1050.

PREVENTIVE IMMUNE BODIES. By 3 consecutive inoculations with 3·55 Mgr. in total of each of both B. typhosus and B. paratyphosus, the protective effect of serum became in most cases 400 times greater than that of normal serum—even after one year it is 5 times greater. Reinoculations produce much more of the protective substances than the original inoculation. Good results from prophylactic inoculations obtained in Americam and Japanese Armies.—Bunshiro Tanabe, per Jl. Trop. Med., April 2/23,115.

Disseminated Sclerosis well treated by weekly ***intravenous injections*** of anti-typhoid vaccine—dose injected sufficient to nduce febrile reaction. The ***Doses usually given*** are 10, 25, 35, 50, 70, 100, 125, 150, 175, 200, 225 and 250 million.—W. H. M. Reaction makes patient ill for a couple of days. Encouraging results—30·6% showed marked improvement. Of 29 cases of the slow, steadily progressive type, 8 were greatly benefited. Improvement maintained up to 2 years.—Sir J. Purves-Stewart, Med. Ann., 1925,393.

Better results with a treatment of Anti-Typhoid Vaccine, Neo-Salvarsan and Calcium Chloride. The Neo-Salvarsan is dissolved in Calcium Chloride solution (10 Cc. of a 10% solution), and the vaccine also mixed with Calcium Chloride. Initial dose of vaccine 25 mill. progressively increased. 11 injections of Calcium Chloride and vaccine, alternating with 11 of Neo-Salvarsan in Calcium Chloride, *i.e.*, 22 injections in all, spread over 11 weeks. 1st dose Neo-Salvarsan 15 cgr., 2nd 30 cgr., and remaining 9 each 45 cgr., making a total of 4·5 Gm. Feeling of intense glowing heat immediately after Calcium Chloride injection and nauseous taste after Calcium-Neo-Salvarsan. Of 64 patients so treated 40 were much improved, 6 of whom became symptom-free: 16 were improved, and 8 showed no improvement. Older patients and longer duration of disease less favourable results. Recent cases with symptoms mainly of cerebellar type specially favourable.—Sir J. Purves-Stewart, Med. Ann. 1926,420.

Rheumatoid Arthritis treated by '(T.A.B.)' Vaccine, *see* p. 675 and Therapeutic Index.

Earlier References to Typhoid.

LIFE CYCLE OF BACTERIA.—Bacteria reproduce themselves in other ways than by simple binary fission. The life cycle in some cases includes an invisible or nearly invisible phase. Certain pathogenic bacteria are shown under certain conditions to give origin to viable and vegetative forms so minute as to come within the category of filterable viruses. Experiments with Typhoid, Paratyphoid and Dysentery Organisms. A paper with excellent microphotos.—E. C. Hort, B.M.J. i./17,571.

TYPHOID CARRIERS, *vide* Vol II.

Living Attenuated Vaccine containing living typhoid organisms (attenuated by heat at 50° C.) gives a higher degree of immunity than the use of dead organisms (given subcutaneously). The strain of organisms should be non-virulent but rich in antigen as determined by animal experiments. The immunisation is only partial.—A. Castellani, L. i./13,595.

Interspacing of doses.—Some cases did well on daily doses. Medium dosage, say 100 millions may be given to begin with gradually increased to 200 or 300 millions with interval of 24 to 48 hours between each dose.

The Vaccine treatment seems to make average cases mild, severe cases into average and only the very worst cases are not favourably affected. Clinical improvement five days after a dose of 2 millions.—F. J. Sadler, Q. Jl. Med., Jan., 1912. Much smaller doses were used than those now suggested.

Two cases of **Paratyphoid B. Infection** treated with Vaccine prepared by cultivating from the fæcal material on Conradi Drigalski medium (*q.v.*) and killing the organisms by heating 45 minutes at 58° C. In this way Vaccine is ready in 48 hours.—W. M. Crofton, B.M.J. ii./13,1373.

See also Edn. XVIII, p. 933.

Vaccinia. Vaccine Lymph (*Therap. Subs. Regns.* 1927 *name*). *Syn.* **Glycerinated Calf-Lymph. Vaccinum. P. Belg.** (as prepared at the Veterinary College of Brussels). **Vaccinum Variolæ U.S. X.**

"Cowpox, or rather the artificially inoculated form of the disease termed *vaccinia*, is nothing more nor less than *variola* modified by transmission through the bovine animal."—Encyclopædia Britannica, to which S. Monckton Copeman contributes the article on Vaccination. For an abstract of the monograph dealing with the objections urged to vaccine lymph, the needs for efficient vaccination, etc.—*Vide* L. ii./11,1504.

Re-Vaccination.—Papules not going on to vesiculation show positive and normal results of the lymph on patients still more or less immune through previous vaccination.

Glycerinated Calf Lymph has advantages over that obtained even from healthy children (as used in the past). Attenuation by passage of the organism through an animal of greater resistance to the disease than man is known as '**Jennerisation.**' The danger of imparting infections and other human disease is absolutely avoided, and there is but slight risk of communicating any disease peculiar to the cow. The place of insertion should be small, otherwise the reaction is too great. The amount of protection afforded seems to be greater than that afforded by humanised lymph. Glycerinated lymph is recognised as the safest lymph for vaccination, and by the VACCINATION ACTS AMENDMENT ACT, 1898, it is enacted that if a child has not been vaccinated when four months and one week old, the public vaccinator of the district shall visit the home of the child, and shall offer to vaccinate the child with Glycerinated Calf Lymph free of charge.

To meet the requirements of the ***Therap. Subs. Act, 1925 and Regns. 1927,*** the animals used must be healthy, the animal after lymph collection shall be examined *p.m.*, the lymph must be treated with Glycerin or other *partial disinfectants* (*v. postea*), it shall be continuously in cold storage at below 0° C.; each tube shall contain enough for *one human subject.* A label on the box or carton must show the proper name, name and address of maker, number of licence, a distinctive batch number, the date of *completion* of manufacture after testing for organisms, and a statement that the potency cannot be relied on for more than 7 days unless it is kept at below 10° C.

In *emergency* a larger amount may be issued in sterile containers of larger dimensions.

Renner's Vaccine Lymph is free from pathogenic organisms. It has been frequently found good and active on testing it eleven months after having taken it from the animal.

Vaccination Lancets of special form are convenient.

Vaccine Injectors of Rubber are prepared of different forms and **Vaccination Shields are** ***sine qua non*** **in careful vaccination.**

N.B.—Vaccine Lymph is destroyed in potency in 36 hours at 37° C. (!), and a temperature of 57° C. destroys it in 5 minutes. Ice chests are arranged for the Govt. Lymph to maintain at 10° C. Even a temperature of −180° for a long period (11) weeks maintains lymph active. Kept 1 year at −5° C. was found more active than that kept at +10° C. same time.—A. Newsholme, M.O., L.G.B.

Chloroform water has been recommended to replace Glycerin to kill off extraneous bacteria, more rapid effect. Urgent demands for vaccine as in an epidemic, could be met by this method with a supply of vaccine in 14 days, instead of the month or 6 weeks necessary for glycerination.

A rapid process of rendering Calf Lymph bacteria-free.—M. Coplans, Jl. Trop. Med., Apl. 15, '26,122.

For the storage and use of lymph it is recommended to mix lymph 50 parts, glycerin 25 parts, and water 25 parts.—Pr. lx. 284.

A treatise, historical, bacteriological, giving the method of manufacture of calf vaccine, the glycerination of the same, the filling into tubes, and the bacteriological examination of lymph.—W. H. M., C.D. ii. 01,629

Differential diagnosis of small-pox and chicken-pox.

The chief points generally relied upon to distinguish chicken-pox from small-pox are the following:

(*a*) The distribution of the eruption, which is found most abundantly on the trunk, and more thinly on the face and hands.

(*b*) The absence of the eruption from the palms, soles and palate, especially in young children.

(*c*) The absence, or short duration, and unimportant character of the pre-eruptive stage.

(*d*) The absence of umbilication of the vesicles in the earlier stages of the eruption.

(*e*) The absence of a pre-eruptive stage.

All these characteristics, however, may fail. In many cases the distribution of the eruption, when scanty, is the same on the face and extremities as on the trunk. Sore throat, accompanied by an outbreak of papules, though usually associated with small-pox, may appear in chicken-pox. Umbilication is often not seen in small-pox at any stage of the eruption, while a slight amount may be seen in chicken-pox. A pre-eruptive stage may occur in chicken-pox similar to that in small-pox.

Other important points, pointing to diagnosis in favour of chicken-pox are the absence of lumbar pain, the presence of elliptical or oval vesicles, continued fever after appearance of eruption, and collapse of the vesicles on being punctured in one spot only.

There are, however, two really reliable signs, at present much neglected which should have preference over all others.

(*a*) The early vesiculation and crusting of the papules, which may occur in so short a period as thirty-six hours.

(*b*) The contemporaneous presence of papules, vesicles and crusts on various parts of the body.—A. T. Brand, B.M.J. ii./22,823.

Cases are missed leading to a sequel of 5, 10, 15 or more deaths, as the case may be. Remarkable difficulty in recognition. Importance of young men familiarising themselves with the subject.—W. McC. Wanklyn, B.M.J. ii./22,775,1045,1092.

A number of abstracts concerning earlier work are now removed; see Edn. XVIII., p. 936. The following are arranged approx. chronologically.

A concise account of Vaccination as first discovered and practised by Edward Jenner.—See a Lecture by R. T. Hewlett, P.J. i./13,398.

Germany has a law which enjoins **Vaccination and Revaccination (made compulsory in 1874).** Smallpox has been practically stamped out there. The total deaths for 10 years (1898 to 1908) in Germany in a population on over 62,000,000 never in one year reached 100—the highest number as

65 in 1908. *During the same decade in different years we had* 600,700 *and* 800 *deaths out of a population of* 44,000,000. Practically no steps in Germany are taken to provide small-pox hospitals.—Dr. Hillier, from a Parliamentary Debate on Vaccination.—B.M.J. i./11,955.

Variola Organism, Cultivation of, Experiments in India.—L. ii./12,20.

Owing to laxity with which vaccination is now enforced an epidemic may break out at any time in the near future.—G. H. Mead, L. ii./18,206.

Half century of Small Pox and vaccination.—J. C. McVail, B.M.J. i./19, 297,339,373,408.

Modified small pox, 3 cases in Essex. It might be wise to insist on isolation of chicken pox for the first 10 days.—W. Allingham, L. i./20,1162.

ORIGIN OF VACCINATION. Benjamin Testy, a Gloucestershire farmer, in 1774 inoculated his wife and family with cowpox to protect them from small-pox. He was stoned for it. In 1796 E. Jenner, the inoculator of small-pox in his district, established the practice of vaccination which the whole world ultimately gripped.—C. Dukes, L. ii./21,1190.

Small-pox in Nottingham, June to August 1921, possibly by infection by contact with imported rags, clothes and the like.—B.M.J. ii./21,333.

Inoculation against small-pox in the Shetlands prior to discovery of vaccination. The bacteria were killed by peat smoke and camphor and the virus attenuated by keeping for years underground.—B.M.J. ii./21,912.

Vaccine Lymph subcutaneously as protection against small-pox. 800 patients were tried—the injection given in the arm. 82% showed focal reaction but no superficial vesiculation except where the needle had scratched the skin. These cases were classed as successful. Twelve of the cases were revaccinated in the usual way and did not 'take.' This was regarded as proof that they were protected.—Ind. Jl. Med. Res., per L. ii./21,243.

Malachite Green or Brilliant Green, as such, or deoxidised to render them colorless, used as purifiers of vaccine lymph. Proportion 1 in 10,000, this being slightly less than the amount advocated by Lœffler in his medium for the express purpose of enabling *B. Coli* to live and flourish. 0·5% Phenol with Glycerin also added, then Sodium Hyposulphite. Further criticisms.—B.M.J. i./22,847. See also Myer Coplans, *ibid.*, 933.

Small-Pox in London. 19 cases during the period July 26th to October 13th, 1922. The outbreak originated in Stepney—a youth of 16. He infected six persons.—For fuller details see B.M.J. ii./22,819.

Small-pox, Treatment of. Solution of Izal used in 1902 instead of Potassium Permanganate. On removal from bath, patient completely bandaged in layers of Alembroth Gauze bandages. The idea was to prevent pustulation by outside organisms. Some cases were confluent, but, in general, the results satisfy.—A. Mearns Fraser, L. ii./22,1303.

Four out of every five of the population in this country are ***unprotected*** by vaccination—(the reproach of Britain.—B.M.J. i./25,621). In an epidemic in Toronto, 3,000 deaths from small-pox resulted from one mistaken diagnosis of chicken-pox. Discussion of differential diagnosis of the common exanthemata.—L. i./22,531.

Small-pox statistics since 1881.—B.M.J. ii./22,943.

Small-pox and vaccination in the Philippines. Published statistics there unreliable.—J. S. McVail, B.M.J. i./23,158.

Small-pox in Central Africa. Small-pox vaccine in powder form deteriorates owing to climate and the long journey from base. Best results obtained by addition of Glycerin to powder.—N. Cantlie, Jl. Trop. Med., Feb. 1/23,35.

Jenner Centenary Celebrations.—An interesting address by Sir W. Hale-White.—B.M.J. i./23,204.

Account of Jenner's life and work.—L. i./23,137.

Early and remarkable spread of Jenner's teachings. Even the Chinese published his work in their own language.—L. i./23,521.

Jenner and small-pox.—Leader, Jl. Trop. Med., Feb. 1/23,46.

Varieties of small-pox.—J. C. McVail B.M.J. ii./23,338.

Herpes zoster and chicken-pox rashes appearing at the same time. The association is still a matter of speculation. A case of chicken pox and herpes eruptions within a period of six weeks.—B.M.J. i./26,697.

A child developed a profuse varicella rash following a severe attack of shingles in her grandmother who lived in the same room.—B.M.J. i./26,902.

Small-pox cases in Willesden.—B.M.J. ii./26,660 L. ii./26,781.

Small-pox and variolation in Palestine.—L. i./26,212.

Painting the face once or twice daily with a ***1 % solution of Potassium Permanganate,*** and the arms and hands with *Tincture of Iodine* once daily, *prevents* severe *scarring* and *pitting* in small-pox.—A. Castellani, Int. Conf. Trop. Am. '24,769.

Small-pox in relation to climatic changes.—L. ii./26,190.

ENCEPHALO-MYELITIS following vaccination.—L. ii./26,504.

Encephalitis developed in thirty-four cases among 240,000 children vaccinated during a year and a half, at a time when epidemic encephalitis was prevalent. Netter advises to refrain from vaccination during an epidemic of encephalitis. —per Jl. A.M.A. ii./25,779.

Possibility of post-vaccinal tetanus.—J. C. McVail, B.M.J. ii./25,355.

Studies of the viruses of vaccinia and variola.—M. Gordon, B.M.J. ii./25,715. L. ii./25,826,874. See also M. Coplans, Jl. Trop. Med. 15/'26,122 : *ibid.* May 1/'26,133.

Impressions of 30 years' experience as Public Vaccinator, covering 40,000 cases. Government Lymph gives better results than others. Absolutely reliable when fresh, but apt to lose activity in hot weather.

Vaccinia a specific infectious disease—primarily and essentially a skin disease. The word 'vaccine' has been annexed improperly by pathologists to indicate a suspension of dead microbes, which are not vaccines but merely toxins. Vaccine is a *living virus.* Pain, swelling, redness, fever, or even headache not essential consequences of successful vaccination, the vesicles alone being essential. A bad arm does not necessarily mean efficient vaccination. Vaccination high up near shoulder may cause neuritis travelling up the neck; it rarely takes on superficial, and not at all on deep nævi, and unsatisfactory on old scars. Adult men often faint after scarification, women hardly ever. On the eighth day a perfect vaccination shows 4 or 5 clean, white, glistening, multi-loculated vesicles, with no redness, pain, œdema, or hardness of arm, no adenitis or fever, drying up during next week without pus or pain, scabs falling off in another two weeks, leaving pitted pink scars which become white in six months. Perfect results in 40 % of infants, but only 5 % of working adults. Adult workers should rest from the eighth to the twelfth day—neglect to do this often the cause of many weeks' suffering and the real origin of the antivaccination movement. *Successful vaccination protects against variola absolutely for* 10 *years, considerably for* 15 *years, slightly for* 25 *years,* and not at all after 30 years. The best answer to objectors claiming exemption, on the ground that they have been done before, is, " If you do not require it, it will not take, so there is no harm in trying."—P. S. Edmunds, M.P.C., Jan. 12/'27,31.

It is advisable for all vaccinated persons to keep their bowels well open with saline purgatives.—G. G. Rigby, B.M.J. i./27,779.

Pending changes in the administration of Vaccine under the new **Poor Law Reform Bill** control to be transferred from Boards of Guardians to County Councils and Boroughs.—J. Bennett, L. i./27,271.

In Great Britain Small-pox is rapidly increasing. The number of cases in recent years have been approx. as follows : 1922, 973 ; 1923, 2,500 ; 1924, 3,800 ; 1925, 5,300 ; 1926, 10,141.—See also Sir George Newman's Report for 1926, B.M.J. ii./27,458.

The cases notified in the months of August, Sept. and Oct., 1927, were 564, 505 and 795 respectively and the total notifications during the period Jan. 2, 1927 to Nov. 5, 1927 were 12,729.—L. ii./27,1106.

Alastrim. Derived from a Portuguese word meaning 'to spread about'—**Amaas**, Kaffir Pox and Milk Pox, in different countries, appear synonymous. The term, '*mild*' small-pox, is a misnomer. Vaccination is of greatest value, but does not afford absolute protection. Points of difference between small-pox and alastrim. May not alastrim be small-pox passed through some other animal and modified into something, which, though related to small-pox, will still continue to breed true to its own type ?—L. M. Moody, Int. Conf. Trop. Am. '24,760-767.

Suggestion to call the two types of small-pox Variola Major and Variola Minor (Alastrim or "Para-small-pox").—L. i./25,92. For differentiation and interrelation.—See also *ibid.* 29, 101, 153,199, 205, 225, 352, 359.

Outbreaks occurred in East Anglia and in Jamaica in 1920. The disease on the whole is of extraordinarily mild character. On recovery there is no deep pitting or scarring. The characteristic odour is absent.—L. ii./21,1286.

L. i./22,403,502. See also B.M.J. ii./22,65,283; J. P. Leake and J. N. Force, per Jl. Trop. Med., June 1/23,199.

Report of outbreak in Antigua, B.W.I.—E. W. R. Branch and W. R. McDonald, Jl. Trop. Med., June 15/23,215.

Blood studies in small-pox with special reference to alastrim.—Prof. W. H. Hoffmann, Jl. Trop. Med., June 15/23,217.

Whooping Cough, Whooping Cough Bacillus (Bordet-Gengou) Vaccine. For details of the Bacillus, *v. Vol. II.*

Is of service in lessening the violence of the paroxysms and shortening the duration of the attack. *Initial dose* for infants, 5 millions. The dose is to be repeated or increased every 4 or 5 days. Ampoules contain 5, 10, 25, 50, 100, 250 and 500 millions.

As *B. Influenzæ* and the Pneumococcus commonly accompany Bordet's bacillus in these attacks the combination of half the dose indicated above of the *B. Influenzæ* and of ¼ the dose indicated above of the Pneumococcus is likely to prove beneficial. A Vaccine of this composition is supplied under the name **Compound Whooping Cough Vaccine.**

Whooping Cough Vaccine appeared of little utility.—D. Paterson and J. M. Smellie, B.M.J. i./22,713. **But good as prophylactics.**—J. F. Rey, *ibid.* 781.

Of 100 cases of whooping cough in children from 0 to 12 years, treated with Bordet-Gengou Vaccine, good results were obtained in all but four. Three injections intramuscularly of 3000 million bacilli usually sufficient.—B.M.J.E. i./26,56.

SENSITISED VACCINES (SERO-VACCINES).

Besredka's Sensitised or sero-vaccines are vaccines which have been treated with the corresponding antisera prior to their use. They are used in larger doses and at shorter intervals than other vaccines.

The following are made in strengths 100, 250, 500, 1,000 and 2,000 million per ampoule :—

- **B. Coli**
- **Diplococcus Meningitidis** (Cerebro-spinal fever).
- **Gonococcus**
- **B. Influenzæ**
- **Pneumococcus**
- **Staphylococcus** (Albus or Aureus or mixed).
- **Streptococcus**
- **B. Typhosus**

For their manufacture in certain instances a supply of human antisera derived from patients who have been highly immunised against the corresponding bacterium have been used, in others antisera derived from calves or horses have had to be employed for the sensitisation of the bacteria. Their keeping properties are not so good as those of the non-sensitised.

Vaccination for typhoid by living sensitised typhoid bacilli.—Though anthrapoid apes cannot be immunised against typhoid by an infecting dose of dead bacilli, sensitised *living* bacteria had that power and the method has been shown to be harmless.—Leader, L. ii./13,27.

Sensitised Typhoid Vaccine (1,000 million per Cc.), dose 1 Cc. upwards adequate. Intervals of about 7 days between doses. Patient should rest 24 hours after a high dose.—W. Broughton-Alcock: L. ii./13,104.

For a complete account of Sensitised Vaccines, see Edn. XVIII., p. 938 *et seq.*

∗**Immunogens** (T.M. 430546).

A series of vaccines of high activity and relative freedom from bacterial cells and toxins. The following are made: **Gonococcus,**

Gonococcus (Combined), Pertussis, Pertussis (Combined), Pneumococcus, Pneumococcus (Combined), Streptococcus, Streptococcus (Combined).

Immunogens constitute a new type of antigen, based upon washing off 24-hour Agar growths of *e.g.*, the typhoid bacillus with Normal Saline, agitating to make a homogeneous suspension, and centrifugalising in place of using a porcelain filter. Both with this and other organisms the antigens obtained in the washings were found to be more potent than broth filtrates. The toxic principles are left behind, the washed bacteria being practically as toxic as before treatment. Intramuscular injections thought to be best. Promising reports in connection with streptococcal, pneumococcal and gonococcal infections are forthcoming. *Initial dose* of the most useful concentration is 0·5 Cc. with rises to 2 Cc. or more.—Sir Thos. Horder and H. S. Ferry, B.M.J. ii./26,177.

Criticism of Immunogens. Detoxicated and defatted -vaccines found to be clinically inert.—Geoffrey Shera, B.M.J. ii./26,360,1243.

✱ **Phylacogens** (T.M. 343296) are filtered, sterilised (72 hours) cultures of pathogenic micro-organisms and are preserved with Phenol 0·5%. The name Phylacogen is derived from Phylaxin, *i.e.*, a defensive protein found in animals that have acquired an artificial immunity to a given infectious disease. The principle is based on the theory of multiple infection. The cultures in question include those of **Pneumonia, Rheumatism, Gonorrhœa, Erysipelas,** and '**Mixed Infection**.' The latter has been advised 'in the treatment of all infections, acute or chronic, in which the condition is not due to a specific micro-organism—notably in surgical infections, abscesses, puerperal sepsis, eczema, fistulæ, etc.' The other Phylacogens are made from this as the basis by adding a filtrate of the specific culture required. Nephritis is a contra-indication to their use subcutaneously. Intravenous injection is contraindicated in nephritis, in arteriosclerosis, and in cases with severe and dangerous cardiac involvement. The initial dose should always be given subcutaneously. Phylacogens are supplied in 10 Cc. vials for hypodermic or intravenous use.—Ther. Gaz., Apl., 1911.

Gonorrhœa Phylacogen.—After the injection there is a feeling of chill followed by a rise in temperature. Most patients suffer from headache after intravenous injection. Sixteen cases. The Phylacogen relieves pain, especially in gonococcal arthritis, but otherwise it does not appear to have any particular therapeutic value in gonococcal infection. The report is not very favourable. Intramuscular injections, though not advised by the makers, found to be more bearable than subcutaneous. The reaction is often distinctly unpleasant.—Major L. W. Harrison, L. ii./13,1375.

Pustulant eczema.—Mixed Phylacogen in doses from 0·5 to 8 Cc. successful.—L. i./13,1764.

Trenchant criticism of Phylacogens by Sir H. D. Rolleston.—L i./14,378.

ANIMAL ORGANOTHERAPY.

ANIMAL GLANDS AND TISSUES AND THEIR PREPARATIONS.

The word Endocrine (derivation: ἔνδον within; κρίνειν to separate), meaning 'any internal secretion,' is still much in vogue. Whilst it remains customary to speak of 'ductless glands' and 'glands with internal secretion,' it has been further suggested to term the secretions of these glands 'incretions.'

Entirely *en passant*, we think most students of the subject would agree with Leonard Williams (L. i./23,256), that endocrinology is still very far from being an exact science.

We continue to include in this chapter a number of 'Organo-therapeutic' medicamenta in addition to the endocrine glands. Insulin, however, is dealt with under Pancreas on p. 640.

Current views on internal secretions critically examined. **Chalone** (from the Greek χαλάω to make slack or relax) is used for secretions with inhibitory or relaxing actions as opposed to hormone—excitant. (Schafer, 1915).—Prof. Swale Vincent, L. ii./22,313.

Endocrinology severely criticised. 'The present vogue of endocrine therapy is only to be compared with the indiscriminate sale of patent medicines.' Every possible tissue is hailed as a therapeutic agent without sufficient experimental confirmation.—Prof. Swale Vincent, L. i./25,739 ; B.M.J. i./25,695.

Of the preparations of the 42 organs advertised and prescribed only one—the Thyroid—was of proven value when given by the mouth. *Tissues generally* contain a depressor substance and there is no reason to believe that this fact has any bearing on the subject of internal secretion. The depressor substance in these extracts has by some been thought to be choline, by others histamine. It appears to be neither, though its real nature is yet unknown.—Prof. Swale Vincent, L. ii./25,332 ; B.M.J. ii./25,1055.

Oral use is very uncertain. Subcutaneous injection the most effective method.—W. Langdon Brown, L. i./25,739.

Only 6 or 7 of 72 American endocrine preparations are active.—Woods Hutchinson, L. ii./25,332.

GLANDS OF THE BODY DIVIDED INTO 3 GROUPS. (1) Those which discharge a secretion at that part where it has to exercise its chemical activities *e.g.* the salivary glands. (2) Those glands which not only have an external secretion, but also have an internal one, which finds its way direct to the blood stream, *e.g.* the pancreas, which, in addition to its secretion into the intestines, is able by means of its cells to control the utilisation of sugar. (3) The ductless *glands*, *e.g.* the thyroid, parathyroid, suprarenal and pituitary. An interesting account of the development of Thyroid and other medication including George Murray's work (a Newcastle physician) who injected the juice of a sheep's thyroid in myxœdema which paved the way to its general use in treatment of cretinism and many other results of hypothyroidism.—W. Martin, P.J. i./23,232.

Animal Membranes for surgical use.

In addition to Goldbeater's Skin, the peritoneum of the ox (known as *Cargile Membrane* in America) the gastro-intestinal mesenteric attachments of the sand-shark, *Carcharias littoralis*, has been used, one of which produces 2 or 3 square feet of gossamer-texture strong material which can be kept in alcohol.

Bone Marrow, Red, Extract.

The marrow of ox and veal-bones and sheep's ribs has been used as a remedy for pernicious anæmia, chlorosis, scurvy, purpura, hæmophilia, debility, lymphadenoma and rickets.

***Marrubin** (T.M. 261511).—*Syn.* GLYCERIN EXTRACT OF RED BONE MARROW, **Medullary Glyceride.**

Dose.—1 to 2 drachms, increased if desired.

A thick brown liquid, made by extraction of the veal-bone marrow. Employed as a substitute for cod-liver oil.

Marrubin has had beneficial effects on weak children, and is suitable for the treatment of anæmic conditions.

SECONDARY ANÆMIA.—Desiccated Red Bone Marrow and Spleen, in equal proportions, given thrice daily in 5 grain doses, gave very definite improvement in 41 out of 46 cases. Treatment continued for 6 or 8 weeks.—B.M.J.E. i./25,17. But not of value in pernicious anæmia.—Pres., May, '26,228.

PULMONARY TUBERCULOSIS improved by treatment with Spleen Extract and Bone Marrow, which definitely increased production of erythrocytes and hæmoglobin.—per Jl. A.M.A. ii./25,1513.

Ox blood, 8 litres, yielded by a process of Alcoholic extraction similar to that used by Banting in making Insulin 1·45 Gm. of an extract named Sanguinin : used on animals and on man with apparently some effect in increasing blood formation, *e.g.*, in pernicious anæmia.—A. Cecil Alport, B.M.J. i./25,1075.

The following are made with *dose* 1 to 2 drachms—

Marrubin cum Pepsina, Marrubin cum Pepsina et Quinina, Marrubin cum Bismutho et Pepsina, Marrubin cum Bismutho et Ferrum. These are nutrient and digestive.

Ⓟ**Marrubin cum Bismutho et Strychnina,** containing $\frac{1}{120}$ to $\frac{1}{60}$ grain Strychnine in 1 to 2 drachms respectively. Tonic.

Also combined with **Cascara, Tinctura Laxativa, Podophyllin, Hypophosphites,** and with **Ferric Phosphate.**

P1 **Marrubin cum Arsenio.** Containing in each drachm $\frac{1}{100}$ grain Arsenious Acid. In pernicious anæmia useful.

***Virol.** (T.M. 251002). A preparation of bone marrow, with malt, egg, and lime. Has nutrient properties for infants.

***Bynotone** (T.M. 399827).—A combination of Bone Marrow (12½%), Yeast Extract, together with Hæmoglobin and Malt Extract. In malnutrition in infants, adolescents and adults. It also supplies the accessory food factors necessary for normal metabolism in infancy. May be taken alone, or mixed with ordinary solid or liquid foods.

Brain and Spinal Cord Extracts.

These, separately or mixed together, may be tried for the relief of locomotor ataxy, chorea, epilepsy, and melancholia. **Cerebral Tablets,** 5 grains. **Myelin Tablets** contain 3 grains.

Thromboplastin. Made by chopping up and extracting fresh ox brains with equal amount of normal saline—leaving in refrigerator 48 hours, pressing through cheese cloth and adding to the extract thus made after diluting with ½ its quantity of salt solution 0·3% Trikresol. Effectual hæmostatic, especially for oozing surfaces. Much used in cases of hæmophilia in the States, *e.g.*, following removal of tonsils and in surgery of bones, glands and nose generally. It maintains its hæmostatic potency for many months.—A. F. Hess, L. ii./15,780.

Anaphylaxis from.—Jl. Ph. Exp. Ther., Nov. 1919.

Spinal Cord Extract.

Dose.—5 to 20 minims thrice daily by the mouth or hypodermically. 1 minim is equivalent to 1 grain of fresh spinal cord.

Spinal Cord Tablets, 2½ grains.

Corpus Luteum (*see also Ovarian Extract*).—The yellow material separated from the inert substances of the ovaries, and desiccated. 1=5 of fresh substance.

Dose.—5 to 10 grains in capsules or tablets three times a day. In disordered uterine and ovarian functions, for menstrual irregularity, whether from excess, deficiency or pain ; for the vomiting of pregnancy, and for nerve disturbances arising from change of life and consequent upon the removal of the ovaries. There is close complementary relation between the thyroid and the ovaries. Administration of Corpus Luteum and thyroid gland is of value in correcting the various forms of neuroses connected with ovarian atrophy. Has also been tried in anæmia, chlorosis, and Graves' disease.

Tablets are prepared equivalent to 1 grain of Desiccated Corpus Luteum=5 grains of fresh substance given in nausea of pregnancy.

Experimental investigation of the corpus luteum in relation to toxæmias of pregnancy.-The investigation was conducted with the purpose of attacking the problem of the causation of eclampsia. A compound was isolated which produces necrosis and changes very similar. It is not present in the placenta. —R. L. Mackenzie Wallis and H. G. E. Williams, L. i./22,784.

STERILITY is said to be capable of treatment by glands. Women with scanty menstruation should receive Corpus Luteum, 5 grains, gradually increased to three times this amount. When associated with excessive obesity and oligomenorrhœa or amenorrhœa they should be treated with thyroid, ½ grain thrice daily.—B. Solomons, B.M.J.E. ii./22,72. Corpus Luteum in the migraine of pregnancy always has good effect.—Luhrs, per Pres., Oct. 23,349. Two substances have been separated from Corpus Luteum called 'luteolipoid' and 'lipanin.' The former has inhibitory action on the menstrual function, the latter stimulated the growth of the genitalia and promoted menstruation. —per Pres., Oct. 23,350. Corpus Luteum preferred to Ovarian substance in vomiting of pregnancy—also recommended for melancholia, obesity and sterility.—per Pres., Oct. 23,351.

An aqueous extract of corpus luteum possessed pronounced styptic property when given subcutaneously or intravenously.—per Pres., May '26,218.

∗Agomensin (T.M. 368559). *Dose.*—1 to 3 tablets, each 1/3 grain, thrice daily.

A preparation of 'early' Corpus Luteum of the cow. For retarded sexual development and genital hypofunction, *e.g.*, functional amenorrhœa, disturbances after castration, menopause, sterility and hypoplasia of genital organs.—B.M.J. ii./25,910.

∗Sistomensine. (T.M. 368560). (Prepared under British Patent No. 113,311.)

Dose.—1 or 2 tablets thrice daily.

Extract of the hormone from older Corpus Luteum. Regulates and stabilises (inhibits) menstruation. For dysmenorrhœa.—B.M.J. ii./25,910.

As a result of biological tests (details given) the *Lancet* found that this preparation injected subcutaneously into female rats produced œstrus.—L. i./27,551,764.

Crotalin. *Syn.* **Cobra Venom.**

Dose.—Hypodermically 1/200 gradually increased to 1/25 grain **(0·0003 to 0·0026 Gm.).**

Prepared from the venom of *Crotalus horridus* (rattle snake). Ampoules are prepared containing a glycerin and water solution with tricresol added as preservative.

Self in the "Medical World," in 1908, made the observation that people bitten by snakes remain proof against attacks of epilepsy for years.

The minimum lethal dose of cobra venom for rats is 1/10th mgr. Toxic constituents described.—Maj. R. Knowles, L. ii./21,177. Antivenene found to be unsatisfactory, *ibid.* 179.

In epilepsy 1/200 grain and then 3 to 5 similar injections at 8 day intervals, then two of 1/75 grain with 14 day intervals—these generally suffice, if not one or more 1/50 grain dose at monthly intervals, then if symptoms not disappeared give 1/25 grain dose if necessary. Modify according to age and nature of the case.

Duodenal Membrane Liquid Extract. *Syn.* SECRETIN EXTRACT (glycerinated). Strength, 1 minim=1 grain of the fresh mucous membrane of the pig. *Dose.*—5 to 20 minims. **Tablets** represent 5 grains.

In diabetes, by stimulating the secretion of the pancreas—with resulting increase in the oxidation process going on in the body.

Elixir Duodenalis. *Dose.*—½ ounce once or twice daily after a meal.

Duodenal Membrane Desiccated. Clean the upper portion of the duodenum of the pig. Scrape off the mucous membrane and scale on glass by drying between 70 and 80° C. Mix three of this with 1 of Calcium Phosphate and pass through No. 60 sieve. The temperature does not destroy activity of the Secretin.

Secretin can be extracted from the duodenal membrane with 0·4% Hydrochloric Acid; nearly neutralise whilst boiling to precipitate proteins, when the Secretin will be left in the filtrate. It is by no means permanent.

Secretin is soluble in water and alcohol.—Bambridge and Menzies, 'Essentials of Physiology,' 1920.

Uses.—Secretin is indicated in all pancreatic insufficiencies, where true organic change has not occurred.

It is employed to advantage in aiding protein digestion; an important factor in raising low urea output to normal; indicated in gastro-enterostomy and jejunostomy; of distinct value in nephritis of intestinal origin; increases peristalsis and is indicated in all cases of stasis.—Beveridge, per Pres., Oct. 23,344.

Mechanism of pancreatic digestion and function of Secretin.—J. Mellanby, Jl. Physiol., May '25,85; per Pres., May '26,208.

See also Vol. II. (Organotherapy).

★Secretogen Elixir. (T.M. 365397.) *Dose.*—1 to 2 drachms (**4 to 8 Cc.**).

A proprietary preparation of Secretin intended to replace Pepsin and Acid mixtures as indigestion remedy. It is stated to contain pyloric prosecretin (with 1/20% of Hydrochloric Acid to change it to secretin) and duodenal secretin. Secretogen Tablets (5 grains) containing the duodenal and pancreatic secretins are suggested particularly in faulty digestion of starch, with fermentation and flatulence.

Eye.—A **Retinal Extract** has been tried in cases of atrophy of the retina and tobacco amaurosis. It is prepared of strength 1 ounce =4 ox retinæ. *Dose.*—2 drachms.

In a case of rectrobulbar neuritis this preparation was remarkably successful. The eye which could not perceive an electric lamp a foot off could, after treatment, see 6/9, and the result seemed to be permanent. Improvement was marked one week after the treatment. Previous treatment for 2 months had been of no avail.—S. Percival, Newcastle-on-Tyne, March, 1915.

Glandulen, from the bronchial glands of sheep in 4 grain tablets, has been tried in phthisis.

Hirudines. **Leeches.** *Hirudo Medicinalis and H. quinquestriatia*—the latter, the five striped Australian leech, is also *B.P.* '14.

(*To remove leeches lodged in the throat, e.g.,* from drinking water containing *Limnatis Nilotica.* Paint the leech with strong cocaine solution (15 or 20%) and remove with forceps or let it be coughed up, patient lying with head hanging. Menthol in Paroleine also suggested.)

Hirudin. *Syn.*—**Leech Extract.**

An active principle from leeches. *Dose,* intravenously, 0·02 to 0·3 Gm. in 50 Cc. Normal Saline. Solutions must be freshly prepared. Has been used in treatment of puerperal eclampsia—theory in the 17th Edn., p. 914.

It has the property of maintaining blood in a fluid condition,—1 mgr. may be dissolved in 0·25 Cc. Normal Saline for the purpose,—this quantity will prevent 7·5 Cc. blood from coagulating without otherwise altering its composition.

Kidney.—Kidney substance has been given in nephritis and other kidney troubles. but the evidence of its value is conflicting.

Liver, Desiccated.—1=8 of fresh substance. *Dose.*—5 grains increased to an ounce, on the basis of recent advocacy in pernicious anæmia (*vide infra*).

It increases diuresis, thus mitigating toxæmia by removing accumulated toxins.

Pernicious (Addisonian) anæmia has been treated at the suggestion of Minot and Murphy in U.S.A. by means of diet embodying large amounts of mammalian liver, cooked and raw, with plenty of vegetables and fresh fruit, but little fat. Calves' or cows' liver 250 Gm., beef or mutton 120 Gm., vegetables at least 300 Gm., fruit 250-500 Gm., cream and butter 40 Gm., milk 240 Gm., potatoes or cereals to make up 2,000 or 3,000 calories, *i.e.*, a diet rich in iron and purin derivatives and proteins, particularly liver, much fruit and fresh vegetables, and relatively low fat. Liver has power of regenerating the blood. Nutritive value equal to red bone marrow.—B.M.J. ii./26,650. All cases treated with benefit.—Minot and Murphy, B.M.J. ii./27,674.

A further statement is: liver or kidneys 200 Gm.; red muscle meat or heart upwards of 125 Gm.; green vegetables not less than 300 Gm.; fruits (grape fruit, oranges, etc.) 400 Gm.; fats restricted to 70 Gm.; bacon, cheese, and dried foods to be avoided; milk to be limited to 240 Gm.; starchy foods not to be taken in excess.—Sir W. H. Willcox, L. ii./27,778.

A useful summary of the diet needed and two cases treated.—J. H. Anderson and E. I. Spriggs, L. ii./27,958.

A liquid extract used in preference in Vienna—a teaspoonful stated to be equivalent of 250 Gm. of liver.—L. ii./27,1315.

Of 20 cases 19 were successful at Newcastle Infirmary. Dose to be controlled by blood counts. When cured 8 ounces of liver thrice weekly maintains condition.—J. C. Spence, B.M.J. ii./27,881; L. ii./27,1026. *See also* G. Bourne, Pr., Dec.'27,373, and B.M.J.E. ii./27,84.

Blood transfusion in.—D. W. Carmalt-Jones, B.M.J. i./27,622.

It is thought there is a specific factor in liver with action on blood regeneration. The active substance is free from lecithin and lipoids protein, iron and carbohydrate. It appears to be either a polypeptide or a nitrogenous base. 10 to 20 Gm. of the active principle of liver tissue is said to be active. Minot still speaks well of this treatment.—Leader, B.M.J. ii./27,602.

Prelim. Rept. by Med. Res. Council with results in 34 cases.—L. i./28,514.

Liver Preparations of Commerce.

For convenience and keeping in hot climates, the pharmacist can provide the preparation in a palatable form for the treatment. In addition to the above *Desiccated Liver Substance* with dosage as stated, numerous Liquid Extracts are available.

Concentrated Fluid Extract of Liver is of strength 1 ounce represents 8 ounces of fresh liver. *Dose.*—½ to 1 tablespoonful daily, divided into 3 doses with meals, each with the juice of an orange.

CIRRHOSIS.—Early cases have been treated with the Glycerin Extract—20 Cc. doses daily.

FUNCTIONS OF LIVER AND METABOLISM OF FATS. The liver is, *inter alia*, evidently the seat of the synthesis of fatty acids. Arachidic Acid has been found to a considerable extent in pig's liver. This acid may be a product of the synthetic activity in question.

Depressor principle of hepatic tissue. It is a non-protein. The active agent is soluble in 80% Alcohol, can be separated from an accompanying pressor substance, and further purified by solubility in Ether. It depresses arterial tension and maintains it at subnormal level for a long time.—Jl. A.M.A. ii./25,194,251,750.

Anabolin. *Dose.*—½ to 2 Cc. intramuscularly daily.
Tablets *Dose*—1 to 3 a day, for use *per os*, are also made.

The preparation is a liver extract stated to stimulate hepatic detoxication and reduce high blood pressure, with consequent improvement in health. ✱Anabol is T.M. 457107.

Lymphatic Glands. **Tablets** 5 grains each. *Dose.*—1 thrice daily.

Have been used in enlarged tonsils and adenoids. The method consists in supplying lymphoid tissue artificially.

Mammary Gland. **Tablets** contain 2 grains of desiccated gland.

Has been used in the treatment of uterine congestion, fibroid tumours and in menorrhagia.

The endocrine basis of pernicious vomiting in pregnancy. Mammary substance by mouth or hypodermically (10% extract) produces startlingly good results.—W. Dickson, Pr., May '26,365.

Mammary Extract is inactive.—J. H. Burn, C.D. ii./26,727.

Mesenteric Gland, Desiccated.

Tablets, 5 grains (0·3 Gm.). Has been used in scleroderma.

Mucin. *Dose.*—5 to 10 grains (**0·3 to 0·6 Gm.**).

This is the essential constituent of the secretions of mucous membranes, buccal, nasal, pharyngeal, &c. It is precipitated from these by alcohol and by acetic acid. The saliva produced by the submaxillary and sublingual glands contains it, but not the parotid. It may be procured from areolar or connective tissue, and from bile.

Taken internally, *e.g.*, **Tablets**, containing Mucin 5 grains with Sodium Bicarbonate 5 grains, relieves painful digestion, gastritis and gastric ulcer. In the form of **Nebula** containing Mucin 5 grains, Sodium Bicarbonate 5 grains, Menthol 1 grain, Lime Water ½ ounce, Distilled Water ½ ounce, has been found of value in dry catarrhs, rhinitis, &c., pharyngitis, and where incrustations are present on the laryngeal lining.

Ovaries. **Tablets, 5 grains.**

In dysmenorrhœa and menorrhagia, and for climacteric ailments. Chlorosis, mental disease and hæmophilia have been treated. *See also Corpus Luteum*, p. 959.

Ovarian gland (*whole gland*) useful in natural menopause, surgical menopause, and the late establishment of menstruation, in relieving the nervous and mental disturbances. Ovarian residue (*after extraction of corpora lutea*) appears useful in late development of puberty, infantilism, irregular menstruation at puberty, menorrhagia, obesity and amenorrhœa. Best given intravenously.—B.M.J.E. ii./21,80.

The female reproductive organs—review of literature.—Pres. May '24,223-6.

Endocrine glands, especially mammary, ovarian and orchitic, in neurasthenia in women—*entirely failed.*—E. Farquhar Buzzard, B.M.J. ii./21,703.

Endocrine factor in producing immunity and susceptibility of the teeth to CARIES. The Calcium utilising power of the body is influenced by secretions of these glands. If enamel forms a complete covering for the teeth caries cannot occur. The teeth of a rabbit fed on Ovarian Extract had thinner enamel than that of one fed on normal diet, while the teeth of a rabbit fed on a mixture of gland extracts were larger and the enamel more dense.—F. W. Broderick, L. ii./21,1216. See also *Parathyroid.*

OSTEOMALACIA treated with Ovarian substance.—Pres., Oct. '23,348.

GRAVES' DISEASE in women treated with Ovarian Extract, a series of 15 to 20 injections of the fresh product being given, 0·2 to 0·25 Gm. injected daily. Injections associated with administration of Hyoscyamus.—B.M.J.E. i./26,31.

Value of Ovarian Therapy is debatable.—Swale Vincent, Proc. Roy. Soc. ed., 18,31,'25. See also B.M.J.E. i./25,26.

The practice of ovarian feeding for every imaginable and imaginative emale complaint, deprecated. Amenorrhœa the most definite point in iagnosis.—K. G. Hancher and J. Rogers, Endocrinol., Jan. '25,21; per Pres., May '26,217.

Ovarian gland tablets can have no effect.—J. H. Burn, C.D. ii./26,727.

Ovarian Hormone.—Standardisation is by noting the power to produce œstrus in ovariectomised animals, a large number being used. The unit of Œstrin is taken as the amount required to produce œstrus in 50% of the animals tested, 20 animals being used for each test.—K. A. Coward, B.M.J. ii./27,1073. See also *ibid.* ii./25,705 and Sistomensin.

Preparation of the hormone from pigs' ovaries, according to method of Allen and Doisy; Hermann and Fränkel, and Dickens, Dodds and Wright. —L. i./26,26. Activity of, confirmed at the Middlesex Hosp.—Swale Vincent, B.M.J. ii./25,1056. A brown oil, soluble in Alcohol and free from Cholesterol. Produces continuous œstrus in ovariectomised animals. Effective by the mouth. Has marked depressor effect, and inhibits blood-sugar reducing action of Insulin.—Dickens, Dodds and Wright, Biochem. Jl., '25, XIX, No. 5, 853; per Pres., May '26,216.

Method for obtaining ovarian hormone in a water-soluble form by extraction from placenta.—F. Dickens and Co-workers, L. i./27,1016,1182; see also E. Laqueur, L. i./27,1126, *re* 'Menformon.'

From the ovary at least three different substances can be obtained—Œstrin, Corpus Luteum Hormone, and Interstitial Hormone—and it is suggested that the composition and properties of an ovarian extract depend on the proportions of these substances present, this, in turn, being dependent on the stage in the ovarian cycle reached by the ovaries when dissected. Œstrin when injected subcutaneously into spayed rats produces typical œstrus; Corpus Luteum is concerned with the prevention of ovulation; and the interstitial hormone when injected into animals causes a secretion of the posterior pituitary lobe.—W. E. Dixon, B.M.J. ii./27,213,1070.

For ovarian extract to have any physiological action in the prevention of premature endometrial necrosis, and therefore hæmorrhage, it should be made either from *mature* Graafian follicles, or from *functioning* corpora lutea—not the degenerated 'yellow bodies,' which are but the empty shell. Not until extracts are made from animals' ovaries during either pro-œstrum or the early months of pregnancy can any uniformly satisfactory therapeutic results be expected.—B. Whitehouse, L. i./27,1279.

✱ **'Varium'** (T.M. 260858) is a trade brand of Ovarian Extract.

Ovamammoid Compound Capsules.

Dose.—1 thrice daily ½ hour before meals and one at bedtime.

Contain 1 grain each Ovarian Extract and Mammary Gland Extract.

Used in neurasthenia, hysteria, insomnia, chlorosis, amenorrhœa and dysmenorrhœa. Stated to be a galactagogue and emmenagogue.

Parotid Gland.

The parotid has been included by some among the endocrine glands and is thought to bear some relation to the thyroid.

Good results reported in ovarian disease from administration of the extract. —per Pres., Oct. '23,372. Has been used to increase salivary secretion.

Pineal Body. *Syn.*, CONARIUM. A small reddish grey vascular body situated behind the third ventricle which is embraced by its two peduncles.

The construction and morphology of the pineal gland suggest a secretory function and it has a distinct nerve supply. Originally its cavity communicated with the cerebro-spinal canal, but as development advanced it was shut off from this connection and became apparently an organ of internal secretion. Clinically, tumours of the gland appear to be associated with precocious sexual development.—B.M.J. i./26,585.

The functions of the pineal gland are little known. Extracts of it when administered act as diuretic and galactogogue. There appears to be some antagonism between the pineal and pituitary bodies as removal of the testicles produces atrophy of the former and hypertrophy of the latter.

It may have an effect upon nutrition and growth, upon sexual development and upon intelligence. It has some connection with accumulations of fat in the subcutaneous tissues.

Pituitary Gland. *Syn.* **Hypophysis Cerebri.**

A small reddish-grey vascular body, a ductless gland, weighing in man about 10 grains, situate at the base of the brain. The average total weight of the Gland in the ox is 2·5 Gm.; anterior part being 2 Gm. and posterior 0·5 Gm. It is said that 8,000 head of cattle are required to produce 1 lb. of dried posterior gland—one would have expected nearly twice the amount—arguing on a 20% dried substance yield.

Anatomically, the gland consists of three parts—the anterior lobe, the *pars intermedia,* and the posterior lobe. The anterior lobe is the larger, and is made up of cubical or polygonal epithelial cells, —in structure it is rather like the fœtal thyroid. Disease of this portion is associated with acromegaly. The *pars intermedia* lies between the anterior and posterior lobes and is developed in connexion with the anterior lobe. The posterior lobe is connected with the floor of the third ventricle, from which it is developed by the neck or infundibulum=a funnel. In man both neck and body are solid with traces of a cavity in the neck.

Physiologically.—In the earlier days the function of the gland was thought to be secretion of nasal mucus, hence the name (*pituita* = mucus or phlegm). Removal of the entire gland leads to depression, muscular weakness, dyspnœa and emaciation. Removal of the anterior lobe leads to genital infantilism (*cf.* however J. A. Walton, *infra*). *Insufficiency* of the pituitary gland is associated with weakness, wasting, etc. *Excessive secretion* is followed by high arterial tension, polyuria, glycosuria and acromegaly.—L. ii./10,1828.

Histology indicates that the *anterior* portion is the active part, the posterior being merely a *vestigial* structure, but *physiologically* the opposite is the case—an extract of the whole gland may be used therapeutically, but the posterior lobe is of greater importance and value, as described later.

Functions of the Pituitary Gland. The anterior and posterior parts appear to have entirely different functions. In two cases in which the gland was completely extirpated, the pituitary fossa at the operation being left absolutely bare, both cases survived and made good progress (*cf.* Cushing's opinion). The function of the gland, therefore, can be almost wholly undertaken by other glands in the body.

The anterior lobe controls metabolism and growth of the skeleton, including bones, cartilage and connective tissue. Should oversecretion be delayed until adult life, there will be an irregular overgrowth of bone and connective tissue, giving rise to acromegaly. In addition to these effects, it is probable that the overgrowth of the gland is associated with changes in the sexual glands, for most cases of acromegaly are clearly asexual. So far, no demonstrable changes have been seen to follow the administration of extracts of the anterior lobe, though Goetsch maintained an increase of growth and early sexual development when given to young animals.

Pars Intermedia. It is held by many that all the effects described as due to changes in the posterior lobe are really due to changes in the pars intermedia.

Posterior Lobe. The effects of administering extracts of this portion are well known. (1) Pressor effect. (2) Depressor effect. There has been observed by many not a rise but a fall in blood pressure. Schafer and Vincent noticed this fall followed second and subsequent doses if they were given soon after the first. Uncertainty as to the relationships between the pressor and depressor effects has made the use of this drug in the treatment of surgical shock not entirely free from danger.

(3) Diuretic effect. (4) Galactagogue effect.—The increased flow of milk in lactating women is only of short duration; the daily flow is not increased. It is increased excretion rather than increased flow (Blair Bell).

(5) Stimulative effect on unstriped muscle. There is no effect on *resting* uterine muscle. Powerful effect has been found in the case of the intestinal muscles, and the drug is largely used in many forms of ileus. A similar effect is seen on the muscular wall of the bladder.

(6) Effect on carbohydrate tolerance. Many diseases of the pituitary gland are associated with distinct and definite change in the patient's tolerance to Carbohydrate, so not infrequently there is glycosuria, *e.g.* in acromegaly. The paper contains a good account of acromegaly and surgery of the pituitary gland.—J. A. Walton, B.M.J. ii./22,835.

Pituitary 'extract' is secreted into the cerebro-spinal fluid (Cushing, confirmed by Dixon). The only substance increasing the action of Pituitary in cerebro-spinal fluid was ovarian extract.—B.M.J.I./23,106.

Blair Bell's Monograph on the Pituitary Body reviewed.—B.M.J. ii. 19,381.

Dr. Dale and others have maintained that the actions on the ***blood pressure*** and on the ***uterus*** are due to ***different substances*** and confirmation of this is now available. The two activities have been almost completely separated and the physician may soon be able to obtain them in standardised solutions.—H. H. Dale, P.J. i./28,248.

Oxytocin (alpha-hypophamine) and **Vasopressin** (beta-hypophamine) have been mentioned.

Histamine.—Presence of, in the hypophysis cerebri. It plays an important role as stimulant for the gastric and intestinal musculature and as a dilator of capillaries during digestion. We daily consume no inconsiderable amount of it.—J. J. Abel and S. Kubota, Jl. Pharm. and Exp. Therap., June, 1919, and Nov., 1919.

D. Cow disputes the conclusion of Abel and Kubota that histamine is the plain muscle stimulating and depressor constituent of the posterior lobe of the pituitary gland, and states that the physiological and chemical evidence of the identity of the two principles do not coincide at every point.

He finds that the uterus of the mouse affords an example of a tract of plain muscle which reacts in one way to histamine and in a diametrically opposed way to pituitary extracts, and his results do not appear to bear out the hypothesis of the authorities mentioned.—Jl. Pharmacol. and Exp. Therap., Nov. '19, p. 273. See also Dudley, *ibid.* 295.

J. H. Burn and H. H. Dale have demonstrated that ***histamine and adrenalin*** are ***antagonistic substances,*** that by acting respectively as dilator and constrictor they maintain and adjust circulation of the blood to the needs of the tissues. The injection of adrenalin into the blood stream corresponds to that outpouring from living gland which accompanies undue emotional stress due to anger or fright. Obviously this latter is abnormal, and the objective of curative medicine must be to restore harmonious working of the secretory organs and the liberation of minute amounts of regulatory hormones.—Trend of Therapeutics, C.D., Oct. 16/26,603.

DISPITUITARISM, OBESITY AND INFANTILISM. An account of the functions of the pituitary gland and treatment.—L. Tidy, L. ii./22,597.

Ovarian conditions determine the liberation of Pituitrin. The ovarian drug is set free in the circulation; it causes the liberation of Pituitrin and the uterus is affected.—Prof. W. E. Dixon, B.M.J. ii./22,410.

Berman suggests that the posterior portion of the pituitary gland is responsible for the differentiation of sexual types. The failure of the posterior portion of this gland therefore makes hermaphroditism. In either sex specific sexual characteristics are less differentiated. Of the anterior portion of the gland, it is more or less established that failure in the male, is an essential condition, if not the sole cause of Frölich's syndrome. The psychic correlative of well developed masculinity is power, and some element of power in character make-up is undoubtedly attributable to the pituitary factor. Imagination is another psychic factor that we have good grounds for associating with the pituitary factor. In short, a rough classification of important hormones would be:—***thyroid for creation; pituitary for subjective power and adrenal for objective power.***—H. Crichton Miller, B.M.J. ii./22 552.

Pituitary Disorders. Amelioration of artificial hypopituitarism has been obtained in animals by intraperitoneal injections of large doses of anterior lobe substance. The administration in the ordinary way of the anterior lobe substance is not convincing.—N. M. Dott, B.M.J. ii./26,1046.

The influence of the ovary on pituitary secretions—a probable factor in parturition.—W. E. Dixon and F. H. A. Marshall, Jl. Physiol., Dec. '24,276, per Pres., May '26,200.

The pituitary gland has a definite function in determining the conservation or *excretion of water and chlorides,* and it is possible that this control is exerted over other constituents of the urine as well. Chloride and phosphate excretion may be affected in opposite directions by pituitary extract.—R. L. Stehle and W. Bourne, Jl. Physiol., July '25,229, per Jl. A.M.A. ii./25,855.

Pituitary gland not essential to life. Providing the hypothalamus is not injured, complete removal of the pituitary does not lead to death in animals. —Pres. May '26,200. See also Jl. A.M.A. ii./25,2037.

Dried Pituitary Preparations.

Of these, there are three, made respectively from the **Entire Glands,** the **Anterior Lobe** and the **Posterior Lobe**:—

(i.). **Pituitary Body, Dried (Entire Gland)** of the ox.

Dose.—1 to 3 grains (0·06 to 0·2 Gm.) thrice daily.

Five parts of fresh gland yield about 1 of dried gland.

TABLETS of this dried entire gland contain 0·06 Gm. (1 grain).

Uses.—Has been employed to improve metabolism, to raise arterial tension, to increase diuretic action and to improve appetite. Given in menstrual disorders and in exophthalmic goitre and with Thyroid (*q.v.*) in obesity.

Small doses, *e.g.,* 1 grain of desiccated gland, are thought to be practically useless in most cases. Five to ten grains thrice daily may be regarded as a minimal dose. Very large doses, *e.g.,* 100 grains thrice daily, have been given without any apparent ill effects.

(ii.) **Pituitary Substance Dried (Anterior Lobe** *only*).

Dose.—1 to 4 grains (0·06 to 0·25 Gm.). 4·5 parts fresh substance yield 1 part of dried substance. **Tablets** 2 grains each.

Uses.—Has been thought to exercise a stimulating action upon growth. Experiments on animals have indicated increased development of the reproductive organs (Cushing).

Has been given in certain types of obesity, also in later stages of acromegaly but not earlier stages; also in bronchial asthma.

Thyroid and anterior pituitary deficiency generally exist together. The dull adenoid type of child often improves on combined treatment.—T. Bodley Scott and F. W. Broderick, Pr., Oct. 1921, p. 278.

INFANTILISM and certain types of amenorrhœa, associated with minor degrees of infantilism treated with anterior lobe by the mouth.—H. Gardiner Hill and J. F. Smith, L. ii./26,222.

Extracts of the anterior lobe of Pituitary Gland, of the Ovary, and of the Mammary Gland, are likely to have no therapeutic action when given by the mouth.—J. H. Burn, P.J. i./27,356.

(iii.) **Pituitary Substance Dried (Posterior Lobe** *only*). *Syn.* PITUITARIUM. U.S. X.

Dose.—1 to 4 grains (0·06 to 0·25 Gm.). (U.S. average ½ grain.) 4·5 parts of the fresh substance yield about 1 of dried substance.

Uses.—Has been used in exophthalmic goitre, acromegaly and by its action on the circulatory system, to relieve cardiac dilatation in intestinal paresis, diabetes insipidus, amenorrhœa and enuresis.

For further details see Pituitary Extract—the liquid equivalent.

Liquid Pituitary Preparations :

(i.) **Pituitary Extract Liquid of** ***Entire*** **Gland** *"Special."*

Dose.—½ to 1 Cc. intramuscularly into the buttock. **Sterules** ½ and 1 Cc. are prepared.

Strength 1=1 of fresh *entire* gland.

Use.—This has been tried in certain types of acromegaly attributable to disease of the pituitary. It is advised to start with ½ Cc. daily and watch the case.

(ii.) **Pituitary Extract Liquid (Anterior Lobe).**

"Sterules," Hypodermic, of this preparation, 1 Cc. and 2 Cc. (in each instance) are made of 20% and 40% strength of fresh gland. They have been given tentatively in retarded growth in children with some evidence of benefit, but it is generally considered that the anterior lobe yields no activity to aqueous media so far as can be detected.—*Cf.* F. W. Gamble, Chairman's Address, B.P. Conf., 1923, and J. H. Burn, C.D., ii./26,727.

Antuitrin. A preparation of the anterior lobe of the pituitary for use in diseases of metabolism, delayed development and derangement of the genito-urinary system. *Dose*, hypodermically 0·5 to 1 Cc.—L. i./22,22.

(iii.) **Pituitary Extract Liquid.** (*Infundibular*—i.e., from the posterior lobe.) *Syn.* **"Pituitary (Posterior Lobe) Extract"** (*Therap. Substances Regulations* 1927, *name*), **Extractum Hypophysis Cerebri Liquidum, Liquor Hypophysis, Liquor Pituitarii** U.S. X.

Dose.—½ to 1 Cc. of an extract of Fresh Infundibulum (10 units per Cc., assayed biologically as described *infra*), *given intramuscularly* to secure prompt action and to avoid superficial sloughing from local vaso-constriction. May be repeated at 1 hour intervals.

A sterile solution containing the active principle of the posterior lobe of the gland of the ox.

'Sterules' of Pituitary (Posterior Lobe) Extract.—½ and 1 Cc. are prepared containing 5 and 10 units respectively.

Doses of ½ Cc. are usual for *obstetrical purposes* and 1 Cc. or more for *surgical requirements*, to raise blood-pressure in surgical shock and post-anæsthetic collapse. In urgent cases the Extract may be administered *per rectum* or intravenously diluted with Normal Saline.

In labour, a dose of 2 units may be expected to hasten a sluggish labour, provided that it is not given before the os is about half dilated. This dose may be safely given at any stage if there is no mechanical obstruction, and its effect may last longer than an hour, which is the least interval at which a dose can be usefully repeated. —A. Bourne and J. H. Burn, P.J. ii./27,485. See also L. ii./27,560; Jl. Obstet. and Gynec. Vol. 34, No. 2, 249.

✱**Infundin.** (T.M. 349379), ✱**Pitibulin** (T.M. 384472), **Pituitarin**, ✱**Pituglandol** (T.M. 417464) and **Pituitrin** are solutions of the Infundibular Extract.

Active Principles of the Gland. A specific active principle has not been isolated. One worker has isolated eight substances from the infundibular portion only 4 of which are active and these four collectively are called **Hypophysin.**—G. B. Roth, Bull. No. 100 Hyg. Lab. U.S. Public Health Service—see Abst. P.J., i./15,410.

A substance to which the name ✱Hypophysin (T.M. 321726) was given was claimed to be the active Hormone of the gland. Patented process of making by precipitating a Sulphuric Acid extractive of the glands with Phosphotungstic Acid and decomposing it again with baryta. The 1 in 1,000 **solutions of the salts so obtained, termed Hypophysin, is stated to be equivalent** in activity to a similar solution of Pituitrin.—P.J. i./13,514,563.—D.M.W. 39, 491; Y.B.P., 1913,21.

Tethelin has not all the properties of Pituitary Extract and is believed to be the mother substance of the active principle of the posterior lobe.—T. B. Robertson and L. A. Ray, Austral. Jl. Exp. Biol. and Med. Sci., Dec. 16, '25,173, per Pres., May '26,200. For further details *see* Edn. XVIII., p. 953.

Preparation of Pituitary Extract is by exhaustion with acidulated water.

To procure 100 Gm. of the pure active principle of the posterior lobe of the Pituitary it would be necessary to work up material from 1,000,000 oxen.—L. ii./26,200.

Recognition.—Pituitary liquid gives the biuret reaction. Alkaloidal precipitants such as Phospho-molybdic Acid, Phospho-tungstic Acid, Bromine Water, etc., all give faint but distinct precipitates of the active principle.

Assay.—U.S. X. assays biologically, comparing activity of the water-soluble principles upon the isolated uterus of the virgin guinea-pig with that of a standard preparation.

Various methods of Standardisation of Pituitary reviewed. Dale and Laidlaw used a 10 to 20% decoction of fresh moist infundibular substance—this of course may vary. Potassium Chloride used.—G. Tate, P.J. i./21,268. Potassium Chloride is not sensitive.—B.M.J. ii./22,1087.

There is apparently no seasonal variation of ox pituitaries.

The **Second Conference on Biological Products** decided it was desirable to express all Pituitary Extracts in units of activity; the activity corresponding to 0·5 mgr. of the standard powder is one unit. Thus, the extract of the U.S.P. contains 10 international units per Cc.—B.M.J. ii./25,534.

The standard powder contains the activity of 7 times its weight of fresh gland, hence the International requirement for a 10 unit preparation, in terms of fresh gland, is that 1 Cc. should contain the activity of 35 mgr. of fresh gland. In other words, the U.S. X. and other 10 unit preparations are actually 3·5% extracts of fresh gland. Assuming a loss of 2/5 activity in manufacture, *it should,* we understand from Dr. Burn, *be possible to produce a* 10 *unit preparation by making a* 6% *extract of fresh substance.*

Therapeutic Substances Regulations, 1927. The Standard Preparation is a dried Acetone-extracted substance from posterior lobes ***kept at the Nat. Inst. of Med. Research, Hampstead.*** The ***unit*** is the activity corresponding to that yielded by ***0·5 mgr. of the standard preparation*** when extracted by an approved method (*cf. antea*). The acidity of the aqueous extract shall be not less than *p*H=5 nor more than *p*H=4. Samples must be tested for sterility and the label must indicate the strength (units per Cc.), Batch No. and Licence No., and name and address of manufacturer.

The effect of Pituitary Extract on the rate of urinary secretion may be of use as a supplement to the uterine test for this substance, since such substances as Histamine and Ergotoxin, the presence of which might lead to confusion in the uterine test, do not affect the secretion of urine.—W. G. Mackersie, J.Pharm. Exp. Ther., '24,XXIV,83, per J.C.S., A. i./24,1140.

INJECTIONS INTO FROGS of minute portions of posterior lobe induce profound darkening of the skin, and complete expansion of the melanophors. *The reaction is so sensitive that its use is suggested as a quick and simple method for the detection or estimation of the potency of such extracts.* The extract from the pituitary gland of a single frog suffices to darken at least 50 other pale individuals, while injection of 1/2,000 of a small clinical dose regularly induces darkening in a pale frog.—L. T. Hogben and F. R. Winton, per Pres., May '24,209.

Earlier Reports on Physiological Examinations.

We may recall that in 1917-1919 we had a number of examinations made of our preparations by a Professor of Physiology in London. The reports were devoted to Blood Pressure, Kidney Volume, Flow of Urine, and Action on the Uterus and Milk Flow. These reports were highly favourable. Full details are given in the XVIIIth Edn., pp. 954, 955.

Deterioration of Pituitary Extracts.

None of the extracts of commerce examined even approximated their theoretical activity of 10 to 20% of fresh infundibular substance. Experiments were made to determine the keeping qualities of fresh infundibular lobes and finished extract. At –10 to –17° C. fresh glands kept for two months without loss of oxytocic activity, but at 0° C. they only retained their activity for 2 weeks. Extracts from fresh infundibular material, sterilised in steam at 100° C. kept their activity for one year in the cold room, and for 8 months when kept on a shelf in the laboratory. At 45° C. the extract lost 20% of its activity in one week and remained at level for 3 months, while at 60° C. rapid deterioration occurs, 80% of the activity being lost after 6 weeks, while at 3 months the extract is practically inert.—M. I. Smith and W. T. McClosky, per Jl. Pharm. Experim. Therap., Mar. 24/138.

Uses.—Pituitary (Posterior Lobe) Extract causes uterine contraction and has a special action on uterine muscle. It stimulates unstriped muscle, especially affecting also the arteries, spleen and intestinal muscles. Should not be injected during the first stages of labour, because if the *os uteri* is not fully open the energetic contractions may cause a rupture of the uterus. It keeps blood pressure raised for hours; but in no way supersedes or takes the place of Saline infusions. It is useful in shock and has control over post partum and other uterine hæmorrhage. It may improve appetite and capacity for sleep.

Contra-indications may be heart disease, arteriosclerosis and kidney disease. In arterial disease of the aged sudden increase of blood pressure by pituitrin might cause apoplexy.—L. i./15,289. See also M.P.C., Jan. 7/20.

N.B.—The Extract produces arterial degeneration if administered too long—it is a remedy for emergency, not routine use.

It is stated to quieten and strengthen heart beat and to increase flow of urine; acts similarly to Digitalis and Strophanthus.

When a second or subsequent dose is wanted the fresh dose will not produce more than a small fraction of its effect unless some time has elapsed.

It is suggested that such preparations may, by action upon the circulatory system, be of value in endocarditis, cardiac dilatation, arteriosclerosis, cerebral anæmia and shock, may favour compensation and lessen tachycardia. Exophthalmic goitre has benefited. Effect on the kidneys points to use in suppression of urine. May control hæmorrhage, *e.g.*, in typhoid fever. Its effect upon metabolism has led to its use in acromegaly and skin affections. *See also the following abstracts for further uses.*

ACROMEGALY. Some good appears to come from its use in a fair proportion of cases.—Guthrie Rankin, L. i./09,28.

Pituitary body and optic chiasma lesion with acromegaly benefited by Pituitary and Thyroid Extracts. Special Extract of the anterior pituitary lobe alone—used with some sign of benefit.—L. i./11,303.

ADDISON'S DISEASE : Two cases benefited.—O. Leyton, B.M.J. i./15,245.

F. Golla was the first to use Pituitary Extract. Subcutaneous injection of the Extract in a case of advanced Addison's disease produced marked rise of blood pressure and diuresis—the latter lasting 24 hours. Action in producing contraction of the uterus is said to last longer than that of Ergot. It should not be used until after completion of the third stage of labour, excepting possibly in certain cases of placenta prævia. Results in 70 cases. Useful in treatment of hæmorrhage, intestinal paresis and shock.—L. ii./10,1828.

The action of Pituitary Extract and Adrenalin on peripheral arteries. Employing the method of O. B. Meyer, adrenalin constricted the peripheral arteries with the exception of the intravisceral portion of the pulmonary, the coronary, and cerebral arteries. The coronary and cerebral vessels were dilated, and the intravisceral portion of the pulmonary was unaffected. Pituitrin produced dilation of the splenic, hepatic, and gastric arteries except along the first 3 or 4 mm. after their origin from the cœliac axis, in which part constriction was produced.—D. V. Cow, Na., March 16/11, p. 101, *see* also L. i./11,939.

In ***labour.*** Useful in full-time pregnancies as a means of inducing strong labour pains, especially where pains have already set in, but have become weak or ceased—½ Cc. in the late first stage acts like a charm. A quick labour often occurs after it.—B.M.J. i./14,906, 1046; B.M.J. ii./16,781. It is of little use in cases of abortion, having little effect in the early months. Appears to act best in the latter part of the second stage.—L. ii. 12,544. B.M.J. i./19,432.

0·5 Cc. every ½ hour with Chloroform anæsthesia. Partial anæsthesia maintained and uterus kept active.—A. F. Martin, B.M.J. ii./22,672.

It is important to see that clots as well as placenta are quickly removed. Give Liquid Extract of Ergot 1 drachm immediately after delivery of placenta and 2 grain Ergotin Pills at 4 hour intervals.—R. Rolfe, B.M.J. i./19,728.

Review of literature in labour.—Pres., Jan.' 23,33; May '24,212.

Hypodermically is much slower and less pronounced than intravenously or intramuscularly. Its use during labour.—W. Blair Bell, B.M.J. i./25,1027.

The action of Pituitary Extract on the uterus.—L. ii./26,343.

The dangers of use in obstetrics.—M. Pierce Rucker, Jl. A.M.A. ii./25,1637.

Intravenous injection of Pituitary Extract in the third stage of labour. From a comparison of two series of 500 cases, it was found that the interval between the birth of the fœtus and the passage of the placenta was reduced by one-half and the loss of blood was also diminished by almost one-half, with the injected patients.—per Pres., May '27,193.

When Pituitary Extract is administered at any part of the alimentary canal, pressor action is never observed, and when introduced into stomach or small intestine it exerts no influence on uterine muscle. When given by mouth after latent period of 8 minutes it exerts marked action on uterus, increasing both tone and automatic movemets.—H. H. Knaus, B.M.J. i./26,235.

Galactagogue action of Pituitary.

In an 'Experimental Investigation of the mechanism of milk secretion with special reference to the action of Animal Extracts' K. Mackenzie (Jl. of Exp. Physiology, Dec., 1911) communicates interesting results.—Extracts from the pituitary body, corpus luteum, pineal body, lactating mammary gland and involuting uterus were found to possess *galactagogue action*—the pituitary gland being the most active. The galactagogue substance of the pituitary body is not destroyed by drying or boiling a weak Saline Extract. Intravenous action is rapid—the matter of a few seconds. Experiments were made on lactating cats—the amount used was 5 Cc. of the Extract = the active principle of 3 pituitary bodies of the ox. Pituitary secretion may be increased during lactation. Extracts of the pituitary body of the fowl are also actively galactagogue injected into cats. It is suggested as of commercial value to determine whether the amount of cow's milk would be similarly increased. Experiments showed that hormones inhibitory of mammary secretion are formed by the fœtus and placenta—see also Atropine and Pilocarpine.

Experiments on the depressor action of Pituitary Extracts indicated that when the blood becomes saturated with Pituitary Extract, an interaction takes place, which converts its constricting action on the peripheral vessels into a dilating one.—P.J. i./12,10.

CHRONIC CONSTIPATION IN INTESTINAL TOXÆMIA well treated with Pituitary Extract hypodermically and *per os.*—Glas. Med. Jl., Sept./13,177.

The use of Pituitary Extract to promote peristalsis in young infants is fraught with danger, since it readily produces intussusception.—J. A. Foote, Jl.A.M.A. ii./25,722.

Constipation due to Morphine corrected by 1 Cc. of extract.—E. Obermer, B.M.J. i./26,17.

Paralytic distention of the intestines—possibly of value in.—New and Non-Off. Remedies, 1914. See also G. R. Murray, Clin. Jl., Aug. 1/23,364.

Heart failure successfully treated. Immediate effect required which could not be obtained from digitalis, strophanthus, etc.—L. i./15,289.

As a temporary cardiac stimulant in acute diseases, such as pneumonia, Pituitrin has been found successful, when Strychnine and Camphor have failed.—G. R. Murray, Clin. Jl., Aug. 1/23,364.

RICKETS, Pituitary Gland in—on the grounds that Pituitrin was found of value in osteomalacia and that the view is held by many that rickets and osteomalacia are manifestations of one and the same disease—the one in early the other in later life. The gland contains a considerable quantity of Phosphorus. Disturbances of Phosphorus metabolism are thought to contribute to rickets.—B.M J.E. i./13,24.

POLYURIA reduced by the pituitary extract increasing the capacity of the kidneys to secrete a concentrated urine. Effect useful in diabetes but transient, lasting for a few days only.—B.M.J. ii./16,298.

Enuresis in children well treated with injections of Pituitary Extract.—per Jl.A.M.A. ii./25,1434.

Intravenous administration of Pituitary Extract produces a definite diuresis in anæsthetised animals. Injected subcutaneously it controls a diuresis produced by intravenous administration of 120 Cc. Ringer's Solution, injected at the rate of 4 Cc. per minute, but if injected at the rate of 12 Cc. per minute no anti-diuretic effect occurs.—Qrtly. Jl. Exper. Physiol., May '25,119, per Jl.A.M.A. ii./25,932.

In the unanæsthetised animal subcutaneous injections of Pituitary may inhibit diuresis for 4 or 5 hours. This can be overcome by oral administration of 1·5% Sodium Chloride solution.—A. McFarlane, Jl.Ph. and Exp. Ther., Aug. '26,206.

Diabetes Insipidus treated by 2 Cc. of Injection hypodermically.—B.M.J. ii./18,197. Antidiuretic effect marked.—M. Davidson, L. ii./20,401. *See also* P. J. Cammidge, Pr., Oct. '20,244.

In Insulin hypoglycæmia, an effective antidote and inhibits Adrenalin hyperglycæmia or glycosuria.—J. H. Burn, per Pres., Oct. 23,334.

A combination of dried Pituitary Extract 1/10 gr. and Ergotin 1 gr., in a capsule three times daily, has been used with success in diabetes insipidus.—C. E. de M. Sajous, Pr., July '24,65.

The preparation of a solid **tartrate principle** of Pituitary infundibular substance, with an action on the isolated uterus from 1,000 to 1,250 times more powerful than Histamine-acid-phosphate.—J. J. Abel and Co-workers, Jl. Ph. and Exp. Ther., Vol. XXII/23,289. Its antidiabetic action in diabetes insipidus.—*ibid.* 317.

Subcutaneous injections of Post-Pituitary markedly antagonise the effect of Insulin on blood-sugar in normal and diabetic individuals.—R. D. Lawrence and R. F. L. Hewlett, B.M.J. i./25,998.

Growth and sugar tolerance increased in children by Pituitary anterior lobe *per os.*—H. Gardiner-Hill, B.M.J. ii./25,1056.

Pituitary Extract by the mouth in a case of diabetes insipidus proved quite useless to control diuresis, even when dried gland corresponding to 2 Gm. of fresh gland was administered daily in Salol-coated pills.—O. Leyton, B.M.J. i./26,304.

Posterior Lobe Extract 1 Cc. subcutaneously of value in diabetes insipidus. —P. Carnot and M. Peron, Paris Med., Oct. 24,'25,339, per Pres. May '26,202.

The active principle of Pituitary is *possibly* allied to Ergamine.—Aldrich and Guggenheim, *see* B.M.J. ii./21,722.

SEVERE HÆMOPTYSIS: Pituitrin, ½ to 1 Cc. intramuscularly, the best immediate remedy. Nitrites increase pulmonary pressure and blood flow.—W. H. Wynn, per Clin. Jl., Jan. 24/23,47.

Bleeding stopped in a case of hæmophilia after one local application and one subcutaneous injection.—Pres., May '24,213.

Serum shock and serum sickness well treated with Pituitary Extract or Adrenalin Solution 1 Cc.—W. M. Crofton, Pres., June '23,235.

In CANCER as a palliative.—J. H. Norgate, per Pres., June '23,238.

In two cases of asphyxia pallida in newly born children, striking results obtained from intramuscular injection of Pituitrin 0·3 Cc.—J. G. Cormack, B.M.J. i./24,570. Also intracardiac injections.—E. H. Rainey, *ibid.* 747.

Pituitary disorders.—Pres., May '24,209-211.

Pituitary extract is not destroyed by the gastric and intestinal enzymes, Pepsin and Pancreatin. The pressor action remains unchanged after action by these enzymes.—Pres., May '24,212. (F. W. Gamble, B.P. Conf., 1923, said the posterior portion was destroyed by the pancreatic juice).

HERPES ZOSTER successfully treated.—Pres., May '24,213.

Severe reactions following intravenous injection of 1 Cc. Pituitrin. Pituitrin is not for intravenous use and the farther it is kept from a vein the better.—D. M. Vasavada, June '25,

Good results with Pituitary Extract in progressive muscular dystrophy —per Jl. A.M.A. ii./25,1002.

Four cases in which mild tuberculous lesions of the arm have followed injections of Pituitary Extract.—M. Donaldson and C. S. Lane-Roberts, B.M.J. ii./27,1165. Probably due to the stirring up of an existing tuberculous focus.—F. R. Walters, B.M.J. ii./27,1207.

Pituitary Extracts made with different concentrations, 0·05% to 6%, of Acetic Acid, giving extracts of pH 7·0 to 3·4, showed no deterioration in their oxytocic activity.—A. Stasiak, Jl. Ph. & Exp. Ther., July '26,7.

Prostate Gland.

An extract of both human and canine, intravenously causes contraction of the bladder and lowers blood pressure.—Battey, Sem. Med., Jan. 15/13.

Liquid extracts of the gland are extremely toxic.—per Pres., Oct. 23,360.

Serum, Horse, Normal.—*Syn.* **Antilytic Serum,** HORSE PLASMA (LIQUID) is supplied in 10 and 25 Cc. vials. *Dose.*—1 to 2 drachms. Employed locally, internally and subcutaneously. In the case of old wounds and ulcers, an antitryptic substance in it may prevent the destruction of newly-formed epithelium by the proteolytic ferments contained in pus.

"**Antilusin**" '**A**' for use *per os* and "**Antilusin**" '**B**' for local application, are preparations of this kind.

Hæmophilia, purpura and pernicious anæmia have been treated with it.

In tuberculosis it has been recommended as an ideal food, also in typhoid; the horse is immune to the former disease. Sheep's plasma is equally satisfactory.

(**Byno-plasma** contains 1 drachm sheep's plasma in every ½ ounce.)

A dose of tuberculin in 10 Cc. of NORMAL HORSE SERUM is less likely to cause the rise of temperature than the same dose in 10 Cc. of Saline.

Chronic Gastric and Duodenal Ulcer Treated.—The serum is given by the mouth 3 or 4 times daily directly after food in ½ ounce of water. 60 or 80 Cc. may be given in 24 hours. The serum must be fresh or serum deprived of its globulins thus rendering its antilytic value artificially increased. A fair idea of the potency of the Serum can be gained by observing its action on an old long-standing wound—if it does not produce a good reaction in 24 to 36 hours it is useless for the purpose.—E. C. Hort.

The utilisation of an individual's own serum has been practised from time immemorial,—whenever artificial hyperæmia has been set in motion by light or heat baths, by poultices and stupes, by Bier's treatment, stimulating lotions and linaments, by painting the skin with Iodine, by blisters, etc., this form of artificial normal serum therapy has been in use.

Hypersensitiveness to horse serum—5 Cc. caused death.—F. B. Gurd and E. Emrys-Roberts, L. i./20,763.

Scarlet fever well treated with immune human serum. Constant fall in temperature and rapid improvement in general condition of patient immediately after administration of serum. Convalescent serum almost specific during early stages of disease.– G.H. Weaver, per Jl. Trop. Med., May 1/22,119.

Coagulose.—A dried serum containing the fibrin ferment required to coagulate blood—used in hæmorrhage hypodermically after re-dissolving.

Haemostatic Serum. *Syn.* **Haemoplastin.** *Dose.*—1 to 2 Cc. injected intravenously or subcutaneously and repeated every 4 to 6 hours until hæmorrhage controlled. A serum derivative stated to promote clotting of the blood.

Hémostyl. Obtained from the horse by bleeding the animal during the regenerative phase which follows a hæmorrhage. The hæmopoietic properties of the serum are increased during this period.—L. i./21,1310.

✱**Incitamin.** (T.M. 410823). A remedy for treatment of slowly healing sores. A preparation composed of horse serum treated with trypsin and freed from coagulable substances, horse saliva and Carbolic Acid—used in the form of poultices. A thick, well-wrung gauze compress is placed over the sore and covered with waterproof sheeting.—J. F. Fisher, B.M.J. i./21,179, 288; L. ii./21,933.

Coagulant hæmostatics should be applied locally at body temperature and the wound should not be allowed to cool; keep if possible at 37·5° C. Application of hæmostatics by continuous irrigation is inadvisable. Coagulen thromboplastin, cephalin, protagulin, hæmoplastin and fibrogen amongst those reported upon.—J. W. Pickering and A. Hemingway, B.M.J. i./26,1029.

In a severe case, hæmopty is arrested by intrapulmonary injection of Coagulen.—A. J. Morland, L. i./25,1238,1257.

✱**Coagulen-Ciba** (T.M. 372474).—Successful use in a case of typhoid with intestinal hæmorrhage.—L. C. D. Irvine, L. ii./25,918.

In two cases of hæmoptysis and one of hæmorrhage Coagulin-Ciba 5 Gm. in 200 Cc. water was given with good results in ounce doses every two hours. —R. W. G. Stewart, Jl. R.N.M.S., Jan. '26,64.

Spleen Substance Desiccated.

Dose.—5 to 10 grains (0·3 to 0·6 Gm.) 1 part represents 5 of the fresh spleen. Has been used in anæmia, tuberculosis, myxœdema, etc. Value in typhoid and malaria possibly due to splenic hormones.

Extract of pig's spleen stated to give 100% of recoveries in tuberculosis of first degree and 75% in all—several hundred cases treated since 1903. One or two injections of 5 Cc. intramuscularly (thigh), or subcutaneously (abdomen) daily for adults. Oral route (in syrup) for prophylaxis, or adjuvant to injections; 4 tablespoonfuls given daily with meals to adults, representing 25 Gm. spleen tissue. Dose injected, or *per os*, proportionally less for children. Treatment absolutely harmless.—Bayle, Presse Med., Sept. 23,'25, per Jl. A.M.A. ii./25,1434. Pres., May '26,227.

Calcium metabolism stimulated by spleen, preparing suitable Calcium Salts for the blood stream and body cells. Splenic and parathyroid extracts suggested for treatment of pulmonary tuberculosis.—per Pres., May '26,227.

✱**Hormonal** (T.M. 330346). *Dose.*—15 to 20 Cc.—less for children.

Said to be a solution of the Hormone of the spleen to which peristaltic action is due. *Two forms* are made—*for intramuscular injection* and *for intravenous use.* Castor Oil (1 ounce) is to be given simultaneously with the intramuscular injections. The intramuscular dose produces, on injection in equal quantities into the right and left gluteal muscles, an effective evacuation. For use in chronic constipation and acute intestinal paralysis. Effects said to be lasting. 20 Cc. Ampoules are prepared, has also been given *per os*.

Two cases benefited by a single injection. Effect difficult to understand.— O. Leyton, B.M.J. i./15,246.

L. Levi quotes many authorities, mostly French and German, to show that Splenic Extract is useful in malaria, typhoid, tuberculosis, in hæmorrhagic conditions such as menorrhagia, and in anæmia.—per Pres., Oct. 23,341.

Suprarenal Gland

An average sheep's gland weighs about 2 Gm. (30 grains).

The glands are situated at the top of each kidney.

The fresh gland was first given to relieve Addison's disease, then dried preparations were used, also liquid extracts, and lastly an active principle, Adrenalin, which, in the form of its hydrochloride, is now used both internally and externally. The compound is however thought to be destroyed by the stomach, but Hale White says gastric contents have no effect on it and he attributes absence of efficacy *per os* on the mucous membrane of the stomach and intestines to dilution, and adds that it is not absorbed by these.

Preparations of Adrenalin cause contraction of small blood vessels when applied locally, blanching the skin or mucous membrane. Locally there is an astringent action, and capillary bleeding, epistaxis and menorrhagia are checked; useful for bleeding after tooth extraction, and of value applied to the nostrils for hay fever and coryza. It is applied by the surgeon to check bleeding and blanch the parts for operations on the eye, ear, nose, throat and larynx.

Distribution of the Adrenalin.—It is thought that Adrenalin is produced in the cortex as well as in the medullary portion of the gland, and that it is stored in the medulla. The cortex is probably the indispensable part of the adrenal. The medulla, apparently, serves merely to reinforce the sympathetic system in time of stress. —Pres, May '24,203-4.

Adrenal Glands are a source of power. They control the sympathetic system, and thereby dominate the 'fight' and 'flight' reactions. But the power quality of the adrenal-centred type is objective, and depends on immediate stimulation. The power coefficient of an individual may be made up of the combined pituitary and adrenal hormones, and varies in type according to which of these predominates. Thus the pituitary-centred individual gives the type with the power-fantasy, while the adrenal-centred individual provides one with power-energy. Our Napoleons, Bottomleys and Northcliffes are presumably pituitary-centred, while the classical type of British Naval Officer can be classed as adrenal-centred.—H. Crichton Miller, B.M.J. ii./22,553. *See also abstracts under 'Pituitary' and 'Thyroid.'*

E. Gley thinks that Adrenalin is not necessary for normal functioning of the nervous system, and is not essential to maintenance of normal life.—per Pres., May '24,203.

The active principles of the Thyroid and Suprarenal Gland are supplemented by the supply of Oxygen—diminution of same has a very definite effect on the central nervous system. Asphyxia brings about an accelerated secretion of Epinephrin, chiefly due to lack of Oxygen. On the other hand the balance of CO_2 cannot be ignored. Its excessive removal from the blood brings about prompt and dangerous fall in blood pressure, due to depression of the vaso-motor centres of the bulb and spinal cord.—Prof. J. C. Meakins, L. ii./22, 230.

Uses.—The gland is really only effective when its preparations are injected or when they can reach the actual bleeding surface—hence will stop hæmatemesis, but not hæmoptysis; it may also be given to relieve syncope from chloroform. Its use has been suggested in Graves' disease and Addison's disease. *For further details see Adrenalin.*

Raw Adrenal gland of value in post-influenzal debility——1/6 gland thrice daily on an empty stomach. Also of value in preventing attacks of asthma.—L. J. Picton, B.M.J. i./27,641.

Suprarenal Gland, Dry.

Dose.—½ to 3 grains, three times a day.

Tablets, Compressed, each equivalent to ½ and 1 grain of **Dry Gland Substance,** are prepared.

Suprarenalum Siccum. U.S. IX. *Average dose.*—4 grains. Suprarenal glands of animals which are used for food by man, freed from fat, cleaned, dried and powdered. Contains 0·4 to 0·6% epinephrine and if assayed biologically 1 Gm. contains the equivalent of 10 mgr. lævo-methylamino-ethanol-catechol (adrenalin). Ash limit, 7%.

In practice we find an average sheep's gland weighing 30 grains yields 5 grains of dry powder.

Addison's disease.—O. Leyton, B.M.J. i./15,245, says it needs 20 to 30 grains thrice daily continued indefinitely.

Exophthalmic Goitre.—Suprarenal gland eulogised. Pulse rate reduced, protrusion of eyeballs disappears. The thyroid gland diminishes. Tremor and every other nervous symptom vanishes and patient is restored to health as stated by the late G. Gibson.—L. ii./12,216. See also Hector Mackenzie, L. ii./16,815.

Suprarenal Snuff.

Dry Suprarenal Gland 1, Menthol 2, Ammonium Chloride 6, Boric Acid 4, Lycopodium 4, for use in hay fever.

Addison's disease.—G. R. Murray states that he has never seen permanent improvement as a result of treatment with Suprarenal Gland.—Clin. Jl., Aug. 1/23,363.

Insufflation Powders for hay fever, of the following formulæ, have been suggested :—

(1) Adrenalin 1, Zinc Stearate 100, Heavy Magnesium Carbonate 900.
(2) Adrenalin 1, Zinc Oxide 100, Bismuth Subcarbonate 400.
(3) Suprarenal Gland Substance 1, Zinc Stearate 20, Zinc Oxide 80.

Tabellæ, Chocolate, contain ½ grain of dry substance equivalent to 4 grains of fresh gland, and are agreeable for internal use.

Liquid Extract of Suprarenal Glands.

Dose.—10 to 15 minims (**0·6 to 1 Cc.**). *Hypodermically,* 1 to 5 minims as such or diluted with normal saline.

Prepared with glycerin, strength 1=1 of fresh gland. It was with this preparation that all the early valuable results were obtained. For local application rarely used stronger than 10%.

Suppositories contain 3 minims of Liquid Extract in 15 grains of Gelatin basis ; to check bleeding piles.

𝔇 𝔓1 **Suppositories, Suprarenal with Morphine.**—These contain ¼ grain of Morphine Hydrochloride in addition.

Suprarenal Ointment.—Liquid Extract of Suprarenal Gland 50 minims, Liquid Paraffin 2 drachms, Hydrous Wool Fat to 1 ounce. It may be scented with Otto of Rose.

Nebula Extracti Suprarenalis—Contains 5% of Liquid Extract. For use as spray in hay fever and coryza.

Adrenalin. *B.P.* '14. (ADRENALINUM). P. BELG., FR. CX. (Tests are given), Ph. Ned. V. *Syn.* **Adrenine,** ✱**Hemisine** (T.M. 250250), ✱**Renaglandin** (T.M. 480619), **Suprarenin, Adnephrin, Paranephrin,** ✱**Vaso-Constrictine** (T.M. 288888), ✱**Vasotonin** (T.M. 326554). **Epinephrina,** U.S. X. Latter gives average Hypodermic dose 0·0005 Gm. (1/120 grain).

The empirical formula usually given is $C_9H_{13}NO_3=183{\cdot}112$, *i.e.* $(OH)_2$. $C_6H_3.CH(OH).CH_2$. NH. CH_3.

It is an active principle of the Suprarenal gland, light brown powder or in grey crystals (first prepared by Takamine). It appears to maintain a proper degree of contraction of the arteries, and hence to correct blood pressure.

U.S.P. X. assays biologically, comparing rise in systolic blood pressure of the dog after intravenous injection with that produced by a standard extract.

Soluble slightly in hot water, also more readily in Hydrochloric Acid, and Boric Acid Solution forming corresponding salts. From concentrated solutions it is precipitated by alkali. Aqueous solutions of its salts are lævorotatory.

Insoluble in alcohol, ether, chloroform, petroleum ether and other organic solvents. Oleic acid is a poor solvent. Not precipitated by ordinary alkaloidal reagents. It is chemically a powerful reducing agent.

On heating above its melting point (263° C.) it decomposes with an odour resembling opium smoke.—Fr. Cx. B.P., 1914, states M.Pt. 205 to 212° C. with partial decomposition. We found commercial Adrenalin to darken at 194° C. and melt at 204° C.

Manufacture.—The suprarenal glands are reduced to pulp and macerated, excluding oxygen as much as possible, in warm (50° to 80° C.) water or very dilute acid for 5 hours, the mixture being then heated at 90° to 95° C. to coagulate albuminoids. This aqueous extractive is evaporated and extracted with alcohol. Precipitation from this liquid of impure Adrenalin follows by means of ammonia. It is purified by ether-alcohol, and re-precipitation with ammonia or fixed alkali.

Suprarenin P.G. VI.—Ortho - Dihydroxyphenylmethylaminomethylcarbinol. *Syn.* Ortho-dioxyphenylethanolmethylamine, is synthetic Adrenalin with allied properties.

Natural Lævogyrate Adrenalin possesses a vaso-constrictive action which is more than double that of the racemic (synthetic) product, the exact relationship being, 1 = 0·46, and from this may be inferred the dangers attending the use of a product not possessing the full activity of the official substance. —Tiffeneau, C. D., May 28/21, p. 708.

r-Adrenalin in small doses of order of 0·01 mgm. increases the blood pressure to a somewhat less degree than l-Adrenalin, the difference in activity in general is about 10–15% but may be 25–30%. As dose is increased to 0·05 mgm. this difference becomes less apparent and with the usual therapeutic dose of 0·04 to 0·1 mgm., there is no disadvantage in the use of the synthetic racemic compound.—J.C.S.A. i./22,891.

Suprarenin synthetic identical in all respects with adrenalin is available.—B.M.J. ii./26,168.

History of Adrenalin.—H. A. D. Jowett, P.J., ii./26,116.

Synthetic Adrenalin usually corresponds to the active natural lævo form, but some preparations appear to be the cheaper racemic form and therefore much less efficient, since dextro-Adrenalin is about 15 times less active than the lævo compound.—C.D., May, 10/24,678.

Substances possessing an Adrenalin-like action have also been ound in putrefying meat, *vide* **Hydroxyphenylethylamine.**

Liquor Adrenalini Hydrochloricus. Adrenalin Chloride Solution.

Syn. GUTTÆ ADRENALIN. R.O.H. *Dose.*—10 to 30 minims (**0·6 to 1·8 Cc.**), by the mouth.

Adrenalin 1, Chloroform 5, Sodium Chloride 9, Dilute Hydrochloric Acid 3, Distilled Water, freshly boiled and cooled to 1,000.

The original preparation contains 1 of Adrenalin Chloride in 1,000 of Normal Saline Solution, with 0·5% of Chloretone.

Hypodermically 1 Cc. injections of the 1 in 1,000 Solution are given or it may be diluted with Normal Saline Solution 10 times (or less). Commercially a solution of strength 1 in 10,000 is made and other dilutions may be prepared freshly as required.

Liquor Epinephrinæ Hydrochloridi. U.S. X. is the same strength. Assayed biologically. *Average dose.*—0·5 Cc. hypodermically.

Uses.

Locally applied, it is of great value in arresting local hæmorrhage, the part becoming blanched—hence its use in superficial wounds and abrasions, in tooth extraction and nose bleeding and during operation to stop capillary hæmorrhage. Solutions are useful in coryza, hay fever and asthma. It may be given by the mouth to check hæmorrhage from the stomach or injected into the rectum, bladder and uterus for bleeding. Applied locally, the vascular constriction lasts ½ to 2 hours. It reduces the swelling in giant urticaria. It is of no value in hæmoptysis; of little use in remote hæmorrhage however given, in fact the rise in blood pressure may increase the hæmorrhage. Hypodermically, it does not materially raise the blood pressure, as the local vascular constriction prevents absorption. Intravenously it is successful in surgical shock, circulatory failure and asthma.—Mitchell Bruce.

In nose operations, submucous injection of 10 minims of 1 in 10,000 solution with 5 minims of 1% Cocaine Hydrochloride is utilised to lessen blood flow.

ASTHMA.—1 to 5 minims hypodermically gives prompt relief in many cases. Continued daily use of even large doses has no harmful effect.—G. R. Murray, Clin. Jl., Aug. 1/23,363.

Suprarenal inadequacy believed to be the fundamental fault in the incidence of asthma. Many cases get relief from an injection.—T. Drummond, B.M.J. i./23,320.

(**Evatmine contains Adrenalin and Pituitary.**)

COLLAPSE in diphtheria, pneumonia and from other causes has been treated by 0·5 to 1 Cc. injections every 1 to 2 hours. *Intravenous injections* of Saline (*q.v.*) with 6 to 8 drops of the Solution to the litre, are practised, also in chloroform syncope and other forms of heart failure.

PERTUSSIS.—Children have taken 1 to 3 drops *per os* or less, according to age. every 3 or 4 hours with good effect.

INTRACTABLE HICCOUGH treated with Adrenalin after Bromide, Chloral, Chloroform and Cocaine in turn had been found of no avail. In a fit of violent and painful hiccough, lavage with Silver Nitrate, and general anæsthesia under Chloroform were equally unsuccessful,—finally two doses of 10 drops of Adrenalin Solution caused it to cease.—P.J. ii./13,808; C.D., Jan. 10, '14.

GASTRIC ULCER.—Probably the best drug to control hæmorrhage. To raise blood pressure in shock and in pneumonia repeated small doses—1 Cc. of 1 in 1,000 every hour required.—O. Leyton, B.M.J. i./15,245.

Adrenalin should not be injected in Chloroform anæsthesia.

Braun considers that Adrenalin should be injected in very dilute solution, the maximum *dose* being 0·5 mgr., *i.e.*, 0·5 Cc. of the 1 in 1,000 Solution diluted with 50 to 200 Cc. of a Cocaine Solution.

STOKES-ADAMS ATTACKS well treated with Adrenalin Solution (5 m. doses) subcutaneously.—A. G. Phear and J. Parkinson, L. i./22,933.

POST-ANÆSTHETIC VOMITING checked by 5 to 8 minims Adrenalin Chloride Solution *per os*.—V. Macdonald, per Pres., Jan. '23,5.

VOMITING IN MALARIA well treated with Solution Adrenalin Hydrochloride 7 to 8 minims—one dose sufficient.—E. Lomax Wood, per Jl. Trop. Med., Aug. 1/22,248.

VERTIGO successfully treated with Adrenalin *per os*. Barbazon insists on the necessity for large doses of the drug—from 10 to 15 drops twice a day and sometimes more. A lasting cure was obtained by giving 20 drops a day. —per Pr., Sept. 23/232.

FRACTURES have been well treated by administration of Adrenalin solution 10 drops and Calcium Phosphate 0·1 Gm., twice daily, in addition to the usual treatment.—Pres., May '24,206.

ALOPECIA—following a history of scarlet fever, fright and malaria—well treated by injection and dried thyroid *per os*.—Pres., May' 24,207.

GAS GANGRENE. Epinephrin, 0·5 Cc., injected in vein at elbow, saved a case apparently moribund.—per Jl. A.M.A. ii./25,1435.

Intramuscular injection of 0·5 Cc. of the 1 in 1,000 solution in the new-born almost regularly increased the leucocytes by 2,000 to 5,000.—per Jl. A.M.A. ii./25,858.

GIANT URTICARIA or Quincke's œdema specifically treated by Adrenalin Hydrochloride, 2 m. of the 1 in 1,000 solution intramuscularly daily for 4 or 5 days, followed by Suprarenalin 1 gr. and Dry Thyroid ¼ gr. twice a day on an empty stomach for three weeks.—H. W. Acton, I.M.G., May '25,200.

Urticarial eruption successfully treated by 10 minims Adrenalin hypodermically.—J. R. Keith, B.M.J. ii./25,1005.

PYLORIC STENOSIS.—Adrenalin intramuscularly in the forearm has decidedly beneficial effect in. Given 10 minutes before feed in form of ¼ mg. doses of Suprarenin Hydrochloride in 1 in 1,000 solution from 3 to 5 times daily. Good results in some cases when combined with use of Atropine.—J. L. Meagher, B.M.J. i./26,89.

RHEUMATIC HEART BLOCK, severe, well treated with Adrenalin solution 4 m. hypodermically—a total of 32 m. in 5 days.—G. A. Sutherland, Arch. Dis. in Child., Feb. '26,21.—per Pres., May '26,199.

HYPERTHYROIDISM.—Adrenalin as a potential factor. Berthelot isolated from the intestine a bacillus (B. phenologenus) which converts Tyrosin into Phenol. Possibly Adrenalin may be formed from Tyrosin.—D. J. Harries, B.M.J. i./23,1015.

Influence of the thyroid gland on the response to Adrenalin.—D. Murray Lyon, B.M.J. i./23,966.

Experiments to ascertain the effect of changes in concentration of Hydrogen-ions on the action of commercial Adrenalin, and of the active principle of the adrenal medulla, Epinephrin. Eyes of toads used.—R. McCarrison, B.M.J. i./23,101.

People sensitive to Adrenalin absorption are generally also sensitive to Novocain absorption.—B.M.J. i./24,715.

Adrenalin secretion is stimulated by Strychnine and Physostigmine. Partial adrenalectomy slightly lowers the resistance of rats to Morphine, and complete adrenalectomy causes great susceptibility to the drug.—Pres., May '24,204.

C. E. de M. Sajous suggests that Vitamin C is the homologue of Adrenalin. Deficiency of Adrenalin underlies the genesis of scorbutus as a deficiency disease. The internal secretion of the adrenals, in traversing the lungs, takes up oxygen and forms adrenoxidase. This corresponds biochemically with a plant oxidase, known as tyrosinase. This substance, he thinks, is Vitamin C. —per Pres., May '24,205.

Adrenalin intravenously inhibits uterine contraction before delivery. The administration of Ether has a similar effect.—A. Bourne and J. H. Burn, P.J. ii./27,490.

Adrenalin is rendered inactive within a few hours in contact with colloidal and organic Silver compounds.—per Pres., May '27,188.

Adrenalin idiosyncrasy.—Some people show toxic effects with a small dose of Adrenalin, especially when given simultaneously with certain local anæsthetics, *e.g.*, Novocain. In dental practice this could be eliminated by avoiding use of solutions stronger than 1 : 100,000. Surgeons should avoid the use of Adrenalin by using a general anæsthetic, when it is found by a small preliminary injection that idiosyncrasy exists. Its use is contraindicated when operating on patients with Graves' disease.—H. E. Symes-Thompson, L. i./24,745.

Possible danger.—An anæmic boy of 15 had his nose packed with gauze soaked in 20% Cocaine Hydrochloride and 1 in 4,000 Adrenalin half an hour before operation for hypertrophied turbinates and adenoids. Patient collapsed under further injection of 5 minims of 1 in 1,000 solution. The symptoms may have resulted from anæmia of the bulb.—J. Allan, Pres., 1913.

A lady gave herself 20 minims of the solution hypodermically for asthma and repeated it every two hours, with little relief for six doses. On arrival home she had administered 120 minims of undiluted solution. Her condition was alarming, she collapsed and her pulse was almost indistinguishable but improved quickly on use of Amyl Nitrite.—F. R. Sawdon, B.M.J. ii./22,866.

Intravenous injection of Adrenalin 40 times more dangerous than subcutaneous.—L. i./24,744.

With long use there is risk of arteriosclerosis.—B.M.J.E. i./26,16.

Intracardiac Injection in resuscitation. No drug known comparable with Adrenalin in efficacy to start an arrested heart or to antagonise the action of Chloroform. The power of Adrenalin, which is equivalent to stimulation of the sympathetic nerve of the heart—to antagonise a *muscular* paralysis, has not been sufficiently realised. For resuscitation in cardiac arrest artificial respiration should be resorted to first by the usual methods. If at the end of 3 or 4 minutes no pulse can be felt, and especially if no heart beats can be heard on auscultation, adrenalin should be injected into an external jugular vein. The abdomen should be opened high up, one hand inserted in the opening, passed up over the left lobe of the liver and the heart massaged intermittently.—J. A. Gunn, B.M.J. i./21,9. *See also* C. Walker, *ibid.*, 46 and J. P. Lockhart-Mummery, *ibid.* 100. (According to the last authority it was possible to revive a cat 20 minutes after all signs of life had ceased. In use it was found more effective to inject a 1 in 50,000 solution of Adrenalin intravenously than to inject into the heart.)

When used for resuscitation, it is necessary to temporarily establish an artificial circulation to carry the drug to the periphery. It acts on the peripheral vessels, chiefly the peripheral arterioles, hence, the intravenous injection is necessary in 2 parts or more, and in dilution of about 1 in 50,000.—J. P. Lockhart Mummery, B.M.J i./21,582.

Injection of 1·2 Cc. (20 min.) into left auricle gave recovery of heart action, after failure under spinal anæsthesia.—Julius Gottesman, M.P.C., Nov.1/22,373.

Intracardiac (right ventricle) injection of 1 Cc. of Adrenalin solution (originally recommended by Winter against sudden abolition of the heart's action by narcotisation—animal experiments were encouraging). The patient was considered dead. Heart action had definitely stopped. A few seconds later there was commencement of the heart beat and 2½ hours afterwards the patient could walk a few steps. It saved his life. Bibliography.—C. Bodon, L. i./23,586.

In a case of anæsthetic syncope in which heart and respiration ceased for 10 minutes, 5 minims of a 1 : 1,000 solution injected gave immediate results—the pulse began again " with a leap."—K. R. Hill, Clin. Jl., Feb. 28/23,104; *see also* J. G. Reed, B.M.J. i./24,820, and Jl. A.M.A. ii./25,1096.

Of 34 cases quoted in the literature of cessation of heart's action during anæsthesia treated by intracardiac injection of Adrenalin, 60% have survived. Useless after 5 minutes.—Presse Med., May 13,'25,629; per Pres., April '26,141.

Recovery by Adrenalin injections into the heart, after heart and respirations had ceased.—E. G. Stuart, L. ii./25,1208.

Stillborn infants responded to Adrenalin by intracardiac injection.—M. G. Cardwell, B.M.J. ii./26,638.

Ventricular activity re-established in Stokes-Adams attacks by intracardiac injection of Adrenalin.—L. i./27,401.

A warning is issued against the incautious use of intracardiac injections in Chloroform syncope, since it enhances the already existing irritation of the parasympathetic. For the first injection no more than 4 minims of the

1 in 1,000 solution in warm saline should be used, repeated or increased to 8 minims later.—Presse Med., '26,84, per Pres., Feb. '27,65.

Decoloration of Solutions.—The solution is liable to turn brownish on exposure. Oxidising agents do it, *e.g.*, Hydrogen Peroxide on neutralising. Loss of activity is proportional to this coloration.

In some experiments which we conducted we found that a small quantity of formalin added retards the colouration of Adrenalin solution. So also does Sodium Hyposulphite.

Adrenol Solution.—A solution of the Adrenal active principle in oily solution. Suitable for spray with an oil atomiser. Dissolve Adrenalin 1 with Alcohol 7 and Hydrochloric Acid *q.s.* (0·2 of actual HCl=0·6 of B.P. '14 Acid approximates theory: we find in practice a little more may be necessary), then add Absolute Alcohol *q.s.* to 12·5 and make up to 1,000 with Castor Oil. Eucalyptol 5 may be incorporated if desired.

Adrenalin Inhalant.—A preparation containing Adrenalin Chloride 1 in 1,000 made with aromatised Hydrocarbon Oil. Is soothing and astringent in inflammatory affections.

Dilutions for use. As spray the Adrenalin Chloride Solution in Normal Saline is diluted to 1 in 2,500, or even 1 in 5,000 parts, is effective in the nostrils or within the uterus.

Adrenalin Tablets are made containing $\frac{1}{65}$ grain (0·001 Gm.) and $\frac{1}{200}$ grain (0·0003 Gm.).

D P1 **Sterules, Hypodermic** of Cocaine Hydrochloride ⅓ grain with Adrenalin $\frac{1}{1000}$ grain in 15 minims for dentists' use are prepared.

D P1 **Tablets of Adrenalin** ($\frac{1}{300}$ grain), with Cocaine Hydrochloride $\frac{1}{6}$ grain) are prepared for dental use. They will fit into cavities where pulp has to be extirpated, or may be dissolved in 15 to 30 minims of water forming a solution suitable for ordinary cases.

Sterules, Hypodermic of Adrenalin Chloride Solution (contain 10 and 15 minims) with elongated ends, which may be snapped off; these are a great convenience, particularly in dental work to check hæmorrhage after tooth extraction.

The 15 minim size are for use with the β-Eucaine Powders in **Infiltration Analgesia.**

P **Injectio Adrenalin Composita**—Vic. Park.

Adrenalin Hydrochloride Solution (1 in 1,000) 5 minims, Atropine Sulphate 1/200 grain, Strychnine Hydrochloride 1/100 grain, in 10 minims of Distilled Water.

Sterules, Ophthalmic of Adrenalin Chloride Solution are prepared. In these, the activity of the solution persists, in all probability for years, owing to their being hermetically sealed.

Adrenalin Lamellæ for ophthalmic use contain $\frac{1}{1000}$ and $\frac{1}{500}$ grain.

Styptic Gelatin.

Gelatin 1½ grains, Adrenalin Solution 15 minims, Water *q.s.* to 60 grains—this quantity for a dose; contains Salicylic Acid 1 grain to the ounce to preserve. Suggested for internal hæmorrhage.

Suppositories, Hollow, of Cacao Butter are prepared, containing 10 minims of the Solution (15 and 30 grain size). As also 1 in 1,000 of the Adrenalin Chloride in the Theobroma mass. For hæmorrhoids.

D P1 **Suppositories of Adrenalin, Cocaine, Hamamelis and Formidin** contain Cocaine Hydrochloride ¾ grain, Hamamelis Extract 3 grains, and Formidin 3 grains. Germicidal, analgesic and tonic astringent. They may be made 15 grain size with 1 of Adrenalin in 1,000 of the basis.

Ⓟ **Trochisci Adrenalin** contain each :—Adrenalin, $\frac{1}{1000}$ grain Heroin, $\frac{1}{100}$ grain ; Ipecacuanha, $\frac{1}{50}$ grain ; Red Gum, 2 grains Rose basis *q.s.* to 20 grains. These are astringent and sedative.

Unguentum Adrenalin. Adrenalin base 1, Lanolin Ointmen 5,000, scented with Geranium Oil. Useful in the nostril in acut coryza and inflamed mucous surfaces.

In neuralgia, neuritis and reflex or referred pain, small quantitie may be rubbed in with advantage.

🄳🄿1 **Adrenalin Catheter Lubricant.**—Adrenalin (base) 1, Cocaine 10 Atropine 10. Dissolve the Adrenalin in Hydrochloric Acid (*B.P.* '14 *q.s.* (0·6 is usually sufficient) diluted with Absolute Alcohol 30 Dissolve the alkaloidal bases in Oleic Acid 20 and mix this and the Adrenalin Solution with sufficient Castor Oil and Absolute Alcoho in proportion of 4 to 1 to make 1,000 of the lubricant.

Isoamylamine and **para-hydroxyphenylethylamine** (*q.v.*) are presso substances like Adrenalin found in putrid meat and Ergot. Unlike Ergo the pressor action is produced when taken by the mouth. The action, thoug less marked, is more prolonged than of Adrenalin.—B.M.J. ii./09,540.

Suprarenal Cortex, Desiccated. (1=6 of fresh gland tissue. *Dose.*—2 to 5 grains thrice daily.

This has been prepared and used experimentally on the assumption tha the cortex has a function distinct from the medulla. The matter is *sub judice* *See also* Distribution of Adrenalin *antea*.

Function of Suprarenal Cortex.

Cortex and medulla are independent and antagonistic. The cortex is closel in association with internal secretion of the pancreas in carbohydrate metabolism and accelerates the external secretion of the pancreas into action It is antagonistic to the thyroid. The parenchyma cells of the pituitary hypertrophy when the cortex is impaired, whether the medulla functions o not, but if the medulla is destroyed the eosinophil cells atrophy. The cortex is essential to life which can be maintained with ¼ of one cortex. Its secretion lowers blood pressure and does not coagulate blood. It is soluble in water o Alcohol, is neither protein nor fat, is antagonistic to Adrenalin and inhibits secretion of that substance by the medulla.—Tokumitsu, B.M.J.E. i./24,40.

***Epinine.** (T.M. 320407). *Syn.*—3-4 DIHYDROXYPHENYLETHY METHYLAMINE. $(OH)_2.C_6H_3.CH_2.CH_2.NH.CH_3=167{\cdot}112$ was obtained by Pyman J.C.S. 96 (1910) 264, from 1-Keto-6-7 dimethoxy-2-Methyl-tetrahydro-isoquinoline by heating it with Hydrochlori Acid at 170 to 175° C.

It differs from Adrenalin by the absence of an aliphatic OH (*cf.* formula). It is supplied in 1% solution to be diluted with Normal Saline. It resembles Adrenalin in action, but the rise of blood pressure though not so intense is said to be more prolonged. For use in ophthalmic work 0·1%, as a styptic to bleeding surfaces 0·1 to 1%, hypodermically 1% and intramuscularly 0·1% solutions are used.

Testis.—The use of an extract from the testicles of animals was asserted to reanimate sexual power.

Liquor Testicularis, Orchic Fluid. *Syn.* ORCHIDIN, TESTICULIN *Dose.*—15 to 30 minims hypodermically, or by the mouth.

Prepared from the testes of animals, by maceration with glycerin and subsequent filtration under pressure in contact with carboni acid, by d'Arsonval's process.

Has been tried for anæmia with irregular menses—injections made between periods, preferably into muscular substance.

In neurasthenia found helpful.—L. ii./13,1455.

Ⓟ**Sterules of Testicular Extract** 10 minims, **Sodium Glycerophosphate** 2 grains and **Strychnine Hydrochloride** 1/50 grain are made. **Tablets of Didymin** (Testicular substance), 5 grains.

STEINACH OPERATION.—22 cases. Contraindicated in advanced senility or seriously impaired cardio-vascular apparatus. The operation is harmless, It causes increased thyroid activity and stimulates other glands if delinquent; increases activity of interstitial cells.—H. Benjamin, per Pres., Oct., 1923,357. J.A.M.A. says no instance of "rejuvenation" has been reported.—*Ibid.* 358.

Results of injection of Testis substance (ram's or goat's) in 650 patients. Neurasthenia, senility, loss of sexual appetite, melancholia, etc., were benefited. acne cleared up, asthma was relieved and tuberculous patients improved.—L. L. Stanley, *ibid*, 359.

Hypodermic injections of Orchitic Extract 1 Cc. twice weekly, for 6 to 9 doses, gave good results in cases of loss of virility and general weakness. —E. C. Plummer, Pr., Dec. '27,388.

ACNE benefited by injection of testicular substance beneath the skin of the abdomen.—L. L. Stanley, Urol. and Cut. Rev., Jan. '26,6, per Pres., May 26,220.

Oral administration of a preparation of testes and adrenals in 70 tuberculous patients and 14 seniles indicated practically no efficacy.—V. Korenchevsky, L. ii./25,1056.

Testicular Extract is inactive.—J. H. Burn, C.D. ii./26,727.

Orally, administration absolutely useless. Of 15 grafting operations there had been some improvement in 30—40%. Advised in paralysis agitans, as 2 out of 5 cases showed marked benefit.—Kenneth Walker, L. i./25,740.

✱ **Testogan** (T.M. 414020).—*Dose.*—A tablet three times daily after meals.

A preparation of the hormones of the reproductive glands and of the glands of internal secretion. Suggested for use in impotence.

✱ **Thelygan** (T.M. 414021).—*Dose.*—As for Testogan.

A preparation made on similar lines for women. Suggested for infantile sterility, undeveloped mammæ, frigidity, sexual disturbances in obesity and other metabolic disorders, climacteric symptoms, amenorrhœa, neurasthenia, hypochondria and dysmenorrhœa.

They are also made in ampoules for intragluteal injection.

Thymus Gland, Desiccated.

Dose.—3 to 10 grains (0·2 to 0·6 Gm.).

One grain of this powder represents 5 grains of the fresh gland of the calf. Has been given to improve the defective nutrition in childhood, Graves' disease, hæmophilia, for anæmia, chlorosis and leucocythæmia, rheumatoid arthritis, and diabetes.

Tablets, 3 and 5 grains.

In infantile paralysis Thymus Gland is indicated. A child can take 15 to 20 grains in 24 hours.—W. MacKenzie, B.M.J. i/15, 63.

Liquid Extract of Thymus Gland. 1=1.

Dose.—½ to 2 drachms (2 to 8 Cc.).

Thymus Extract is inactive.—J. H. Burn, C.D. ii./26,727.

A. E. Garrod.—Clinical aspects of the thymus gland.—B.M.J. ii./14,571.

Enlargement of the thymus sometimes accompanies, and may be the cause of, sudden death with heart failure ('thymus death')—frequently occurs during anæsthesia. Thymic enlargements may cause attacks of difficult breathing ('thymic asthma').—Per Pres. Oct. '23,262. J. A. Hammar says that there is no reliable evidence that sudden death is due to abnormality of the thymus. Death may follow as a result of asthma, but in 'thymus death' the thymus plays no part.—*Ibid.*

Psoriasis well treated by Thymus Extract intramuscularly.—Per Pres., Oct. 23,365. Psoriasis, lichen ruber planus, verrucosis and ichthycosis can be cured or greatly improved by exposure of the thymus to X-Rays.—W. Brock, *ibid.* In exophthalmic and colloid goitre it has good effects (some say contraindicated!), especially if combined with Iodine.—*Ibid.* Tardy growth and non-development in children appear to benefit from its use.—*Ibid.* Should be given with caution to gouty persons and in pregnancy.—*Ibid.*

The thymus thought to be the central organ for metabolism of vitamins in young animals and that after puberty the vitamins are stored in the sex glands to provide for the first endowment of the progeny.—Per Pres., May '24,228.

Man is more sensitive than animals to thymectomy. Removal of the thymus before puberty produces abnormal conditions, leading to death. It has a trophic as well as an evolutive action. It also has an important influence in the calcium metabolism, the bones becoming hypocalcified after thymectomy. —Pres., May '24,229.

The absolute weight of the Thymus increases rapidly during the first two years of life, changing little till the seventh year, when it again increases, to fall slightly after the eleventh year. Heavier in the male at birth and for first four years of life, after which weight is approximately equal in the two sexes until eleventh year, when it tends to be absolutely heavier in the female.—A. B. Bratton, Jl. Path. & Bact. (Edin.), Oct. '25, per Jl. A.M.A. ii./25,1996.

At the Middlesex Hospital all children up to 14 years must have thymic X-Ray examination before operative procedures are undertaken.—J. W. Fisher, Jl. Lab. & Clin. Med., per Pres. May '26,223.

Acidum Thyminicum. *Syn.* ✱**Solurol.** (T.M. 264148). Nucleotin-phosphoric acid. *Dose.*—5 to 10 grains (**0·3 to 0·6 Gm.**) after meals.

Approximate composition :—$C_{20}H_{35}N_3O_{16}P_2$ (Kossel)=635·358.

A product of the metabolism of the nucleins present in food containing nucleo-proteins, *e.g.*, thymus gland, pancreas, spleen, etc. It possesses affinity for, and solvent action on, Uric Acid. Uric Acid formed in the body without its equivalent of Thyminic Acid is stated to be precipitated. It is, therefore, employed in the treatment of gouty affections; 1 of the acid will dissolve 1.3 of Uric Acid at 100° F. *in vitro.* It has no especial incompatibilities when in solution. Feebly acid, but as far as uric acid is concerned it probably acts as a base. It is thought to be non-toxic and non-depressant. Has been given in 2 grain doses by **intra-muscular injection** in severe gouty affections, especially neuritis.

Soluble with ease 1 in 5, stronger solutions may be prepared, but it is mostly prescribed as **Thyminic Acid Tablets**, 4 grains, and in Cachets.

Thyroid Gland.

This gland and preparations made from it, have been employed for relieving myxœdema, cretinism, lupus, psoriasis and chronic eczema. Latterly its use has extended to obesity, menstrual disorders, neurasthenia, insanity, migraine and chronic rheumatic affections. The methods employed have been (1) by feeding with the glands; (2) by grafting (Victor Horsley, B.M.J. i./90,287; ii./90,201); (3) by the exhibition of **Thyroid Solution** by the mouth or hypodermically; (4) by **Dry Thyroid** in powders, cachets or tablets. Success has been most notable in cases of myxœdema in which prolonged treatment is necessary; obese and insane persons and weak-minded children have also improved under its use.

The action, on administration of thyroid gland preparations, is

(1) a stimulating one—metabolism is increased by a process of katalysis; and (2) the production, by means of the parathyroid tissue present when sheep's gland is used, of a substance which has the effect of neutralising the toxic results of this metabolism.

It should be noted that the Thyroid preparations on the market (mostly made from sheep's thyroids) are obtained from parathyroid as well as thyroid tissues; deficiences, therefore, in both these glands in man are met by feeding with these preparations. Signs of thyroidism must be carefully watched for during administration of Thyroid preparations.

One lobe (½ gland) of the sheep's gland, we find, weighs on an average about 35 grains and yields about 9 grains of dry thyroid.

Thyroid gland treatment of myxœdema and cretinism. The original case of myxœdema first treated (hypodermically) years ago (by Murray) with Liquor Thyroidel enjoyed health by taking 10 minims of the Liquor each day—6½ ounces in the course of the year—less than a gallon in 22 years. As to other uses of Thyroid, the marked emaciation caused by excessive secretion in exophthalmic goitre indicates its employment in obesity—in some cases good results—with adequate diet. Also sometimes valuable in rickets, rheumatoid arthritis and nocturnal enuresis. As it improves the skin in myxœdema it has been used in psoriasis and other cutaneous diseases.—G. R. Murray, B.M.J. ii./13,163; L. ii./13,201. Murray's patient took Thyroid for 28 years. Atrophy of the thyroid need not shorten life provided this substitution treatment be fully maintained.—B.M.J. i./20,359.

In exophthalmic goitre Thyroid is totally ***unsuited***—it aggravates the condition. *cf.* Potassium Iodide. Arsenic and Ergot internally with Iodine locally reduced the swelling in a case but it returned, subsequently surgical measures produced good effect.—L. i./11,735.

Use of Suprarenal gland is successful, *v.*p. 976.

Myxœdema, on the other hand, is speedily improved by Thyroid and a more or less complete cure is established. 'The results,' says Osler, 'are unparalleled by anything in the whole range of curative measures. Within a few weeks a poor feeble-minded toad-like caricature of humanity may be restored to mental and bodily health.'

V. Horsley had previously to Murray's work practised transplantation of sheep's thyroid gland into the tissues of a myxœdematous patient. Later McKenzie showed internal use of Thyroid preparations equally good.

The patient must continue to take the preparation more or less all his life.

Cretinism—Thyroid treatment. Results vary from complete idiocy to normality.—A. E. Naish, L. i./25,91.

A new conception of the thyroid gland. The Applied Anatomy and Physiology of the Thyroid Apparatus.—G. S. Williamson and I. Pearse, Brit. Journ. Surg. 1926, xiii,466; B.M.J. i./26,625.

Over-doses of Thyroid preparations may cause rapid pulse, 'racing' of the heart, feverishness, headache, pruritus, and even delirium. Chronic thyroid poisoning has also been observed—the symptoms being emaciation muscular weakness, loss of hair, dilated pupils, and general debility.

Thyroid, Excessive use of (Police Court Case).—L. i./12,751.

A single large dose of Thyroid fed to goats produces no effect—the same quantity in small amounts over a period produces symptoms.—Prof. A. J. Clark, B.M.J. ii./25,847.

Thyroxin.—$C_{15}H_{11}O_4NI_4$ (*Harington*)=776.824.

(The formula given in U.S. X., as found by E. C. Kendall, is believed to be incorrect.)

¶*Dose.*—The *preliminary* daily dose should never exceed 0·2 mgr. For an adult case of myxœdema the dose is about 1½ mgr. Normally, an individual cannot take more than 2 mgr. a day continuously without developing signs of hyperthyroidism. U.S. X. gives 1/120th grain (0.0005 Gm.). The dose is taken whole *per os* with half a tumbler of water one hour before meals.

Thyroxin Tablets of the **Sodium Salt** are available of strength 0.2, 0.4, 0.8, and 2 mgr.

For *intravenous use* the dose in *crystals not* tablets is dissolved with aid of a drop of 10% Sodium Hydroxide Solution in 1 cc. of water. *Solutions must be fresh. Dose* from 1 to 10 mgr. The amount is determined by the basal metabolic rate. 1 mgr. increases the rate of an average adult 2%. With a myxœdema patient the maximum effect is produced on the tenth day after a single injection.

Caution.—The action of Thyroxin persists for about 15 days. Wait until has effect passed off before giving a fresh injection.

Preparation.—C. R. Harington received the Harrison Memorial Prize for his work on this compound. He describes in the Biochemical Jl., Vol. XX. No. 2, p. 293, a new method, using a dilute Barium Hydroxide solution for extraction. The method gives a yield of about 0·12% from the dry Thyroid gland, as against 0·0011% obtained by Kendall, using Sodium Hydroxide.

The Thyroxin finally obtained is perfectly white (though the preparation of commerce is yellowish), and crystallises in rosettes and sheaves of fine needles, darkening at 220° C., and melting with decomposition and evolution of Iodine at 231° C. to 233° C. Physiological tests gave a reaction typical of those described by American investigators for Thyroxin.

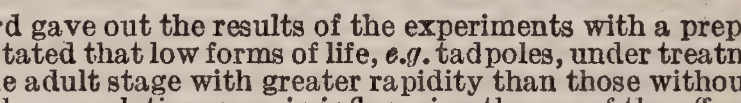
Though thyroxin reproduces the therapeutic action of thyroid, it is stated not to be present therein, but is produced during process of extraction. Thus the nature of the thyroxin-yielding substance is still a problem to be solved, as also what are the essential materials from its formation (presumably trytophane and iodine).

J. Huxley at Oxford gave out the results of the experiments with a preparation of this kind and stated that low forms of life, *e.g.* tadpoles, under treatment with it, develop to the adult stage with greater rapidity than those without it. It might be utilised, the speculation goes, in influencing the sex of the offspring in man.

Thyroxin being an Iodine derivative of **Tryptophane**, a substance normally present in the circulating blood as a product of protein digestion, there is a constant supply of raw material for its manufacture. In hyperthyroidism there is over-production and an abnormally high catabolism—the action of Thyroxin as a catalyst increases tissue destruction.—Pres., Oct., 1922, 311,334.

Synthesis of Thyroxin by C. R. Harington and G. Barger :

Hydroquinone monomethyl ether is combined with Tri-iodo-nitrobenzene, yielding the diphenyl ether $CH_3.O.C_6H_4.O.C_6H_2I_2.NO_2$. The nitro group is successively changed into an amino group, a cyanide group, and an aldehyde group, which is then condensed with Hippuric Acid. Hydrolysis with Sulphuric and Hydriodic Acids yields the amino acid, $HO.C_6H_4.O.C_6H_2I_2.CH_2.CH.NH_2.COOH$. On iodising, Thyroxin is produced having the following structural formula :



After purification, the substance was found to have the properties of natural Thyroxin, both products being the racemic form.

Thyroxin is present in the thyroid as a constituent of a complex protein, being liberated by digestive ferments in the intestine, so that its action may not be absolutely identical with the gland substance.—G. Barger, Pres., May, '27,161.

The Synthesis of Thyroxin.

C. R. Harington (Biochem. Jl., '26,300), in his work on the structure of Thyroxin, showed that Deiodothyroxin, a degradation product, was α amino β-4-(*p*-hydroxyphenoxy)-*p*henyl-propionic Acid. $HO.C_6H_4O - C_6H_4.CH_2.CH\ NH_2.COOH$. It is obtained by shaking Thyroxin in an atmosphere of Hydrogen with Palladium Hydroxide-Calcium Carbonate as catalyst—the

Iodine atoms being replaced by Hydrogen.—G. Barger, B.M.J. i./26,1092; ii./26,1234; ii./27,861. L. ii./26,192; i./27,719. P.J. ii./26,734; ii./27,609.

Uses.—The substance is thought to represent the therapeutic activity of the gland. It has been estimated that the body of a normal adult contains in all about 14 mgr. of Thyroxin, and that the daily rate of destruction of the substance is 1-1.5 mgr.: according to this calculation, therefore, a daily dose of 1.5 mgr. would be required to maintain the basal metabolic rate of a completely thyroidless individual at the normal level.

Under favourable conditions during its preparations it may be said that 1 Gm. (15 grains) of desiccated thyroid contains approx. 1 mgr. of Thyroxin, and this fact may be used to advantage in determining for a given patient the dose of Thyroxin, if a change is made from desiccated thyroid to Thyroxin.

A general quickener of metabolism. Uses and Abuses of Endocrine Therapy. —W. Langdon Brown, B.M.J. ii./25,1051.

The thyroid hormone alters the balance normally held between output of sugar from the liver and its removal from circulation under the influence of Insulin secreted by the pancreas, by accentuating the response of the liver and thereby increasing the hyperglycæmia produced by Adrenalin, and reducing the effect of Insulin.—J. H. Burn, P.J. i./26,292.

Function of Adrenalin may be to control oxidation.—H. E. Armstrong, Proc. Roy. Soc., '25,98,202. Moureu suggests the same as to Thyroxin. If this is confirmed it is remarkable that the two endocrine principles thus far isolated have similar function and are active at centres. Oxidation being one of the main functions of the living organism it is to be expected that the process is subject to rigid control in all its variations; even Insulin at least serves to catch and prepare sugar for oxidation.—P.J. i./26,369.

Myxœdema.—Striking results with the synthetic product in two cases. —L. i./27,883.

It is calculated that one mgr. of Thyroxin causes an average increase of 2·8% in the B.M.R. In myxœdema, dried Thyroid ¼ grain should be given once a day, increasing to twice a day at the end of one week, to ½ grain twice daily at the end of another week, and later to 1 grain twice a day.—H. Gardiner-Hill, L. ii./27,621.

See also Tests for Thyroid activity, p. 992.

Liquor Thyroidei, THYROID SOLUTION (B.P. 1898).

Dose.—5 to 15 minims (0·3 to 1 Cc.), freshly prepared. 100 minims represent one entire gland.

It is better to add glycerin 15 to 20 of the sliced and bruised tissue, macerate 24 hours, press, and make up to the required volume with glycerin and water *partes æquales.* Mixtures should be prescribed with Chloroform Water.

It was a mistake to de-officialise this. It is a convenient mode of taking. During the war it was unavailable and patients had to be put on dried gland. They preferred to go back to the Liquor when it became available again.— W. Martin, P.J. i./23,233.

Flavoring.—Glyl or Syl Aurantii Floris, Glyl or Syl Amygdalæ Amaræ; Syrupus Limonis.

Assay.—The author suggests Standardisation with a content of **0·025 Gm.** *organically combined Iodine per* 100 *Cc., vide Vol. II.*

Hypodermic and Intravenous Injection of Thyroid Preparations.

Our experiments showed that Liquor Thyroidei B.P. *even with* the addition of 0·5% Phenol is not sterile. Further work showed that spores were not killed by boiling for ½ hour in sealed ampoules, but a temperature of 120° C. for ½ hour in the autoclave was sufficient to kill all bacteria.

This treatment causes coagulation of the albuminoid constituents and in all probability is injurious to the active thyroid principle.

Finally, experiments were made by the method of partial or intermittent sterilisation at 60° C. for ½ hour for 10 successive days. In this case gelatinisation was less pronounced, but even this preparation was *not sterile.* Infections can, however, be made by means of a sterilised porous clay filter.—**W. H. M., Expts., Nov. 1920.**

Thyroideum Siccum, Dry Thyroid (*B.P.* '14). *Syn.* "Thyroid Extract." (Avoid the name "Extract.")

Dose.—½ to 4 grains (0·03 to 0·25 Gm.), in cachets.

Should not exceed 15 grains daily.—W. W. W.

Prepared from healthy fresh glands of sheep; the surrounding fat, etc., is first removed; the glands are finely powdered after drying at not exceeding 40° C.; and finally the substance is freed from fat by Ether percolation. (One part equals about 5 of fresh gland.)

Relation between doses of Liquor Thyroidei and Thyroideum Siccum.
N. H. Martin pointed out that:—
5 to 15 minims of Liquor Thyroidei = 2½ to 7 grains of fresh gland,
3 to 10 grains of Thyroideum Siccum = 11 to 35 grains of fresh gland,
and, therefore, that the dose of Dry Thyroid is about five times too strong in proportion to that of liquor. If reckoned on iodine content the dose of dried thyroid is about ten times too strong in proportion.—P.J. ii./12,145.

***Assay.**—The author standardises this preparation to* 0·2% *Iodine in organic combination.* U.S. has this as average, P. Belg., 0·03%.

P.G. VI. requires at least 0·18% Iodine with precise methods of detection of adulteration with Iodine compounds. Ph. Ned. V. adjusts to 0·3% with Lactose. *For Method of Assay, see Vol. II.*

In many samples examined the Iodine content rarely, if ever, fell below 0·25% for Thyroideum Siccum.—W. Martin, P.J. i./23,233.

Thyroid '**Extract**' is an unfortunate name to indicate Thyroideum Siccum (*B.P.* '14). The fresh glands basis also introduces grave misunderstanding. Myxœdema, a case did no good with a course on the latter basis, but when dosage of Thyroideum Siccum was given there was improvement at once.—A. E. Carver, B.M.J. ii./17,515. W. H. Martindale, in support of this letter draws attention to the necessity of standardising Thyroideum Siccum.—*Ibid.* 570. See also A. Goodall, B.M.J., i./14,1351.

Standardised Thyroid Tablets, 1½ and 5 grains (0·1 and 0·3 Gm.). (*We discard the old fresh substance basis for Thyroid Tablets as being unscientific and misleading.*)

A confusing letter on Thyroid dosage by Professor Dixon. It is stated that the dose in tablet form is weighed as fresh gland—this is of course not the case.—B.M.J. ii./22,948.

The dosage of Thyroid expressed in fresh glands is about as rational as reference to the ***dosage of Morphine to the fresh juice of the poppy.*** The latest studies give renewed support to the assertion of a close parallelism between the physiological activity of Thyroid preparations and their Iodine content. Since some Thyroid has 5 times as much Iodine as others, ***there is a possibility of one tablet having as much physiologic activity as a very large number of other tablets***. If all physicians were to base their dosage on Thyroideum Siccum, the confusion would be relieved, and Thyroid therapy placed on a more rational basis.—Jl. A.M.A. ii./25,978.

The absurd tendency to speak in terms of fresh gland is fortunately disappearing. Only one form of Thyroid Gland should be recognised for medicinal purposes—Thyroideum Siccum, B.P., or dry Thyroid.—Pres., May, '26,186.

Standardisation of Thyroid preparations by the Acetonitril Reaction.—B.M.J.E. ii./25,24.

1% Sodium Chloride or Potassium Nitrate as preservative is said to be desirable.—F. G. Hobart, P.J. i./26,329.

✱**Thyroglandlin.** (T.M. 279798), is a trade brand of dry Thyroid. *Dose.*—3 to 5 grains.

'Four Gland' Tablets. *Syn.* COMPOUND THYROID TABLETS. *Martindale. Dose.*—One or two twice daily for adults,—young children in proportion.

These Tablets contain 1 grain each of Thyroid, Thymus, Suprarenal and Pituitary Gland substance.

A treatment in mental and physical deficiency based on the therapeutic action of the internal secretions—the *combined action* of the internal secretions is aimed at. Correlated action in various diseased conditions between the thyroid and thymus gland, the suprarenal gland and the pituitary gland, etc., is proved also between the thymus and the suprarenals and testicle and ovary, also between the suprarenal, pancreas and pituitary and so on. In short, physical, mental and metabolic changes occur as result of interference with the internal secretion of nearly all the ductless glands.

The above tablets have been given in myxœdema, in cretinism and infantilism with good mental and promising general results. Active rickets improved by half a tablet twice a day. Tablets containing extracts of the pancreas, testes and ovary also suggested.—A. S. Woodwark, St. Bart.'s Hosp. Rep. Vol. XLVIII.

'Three Gland' Tablets—omitting the suprarenal gland—have also been employed on the same lines.

Elixir of 'Four Glands,' *Martindale,* is also prepared. *Dose.*—1 to 2 drachms = 1 to 2 'Four Gland' Tablets.

Elixir of 'Three Glands,' *Martindale. Dose.*—1 to 2 drachms = 1 to 2 'Three Gland' Tablets.—These Elixirs have also been employed in the same conditions as the Tablets.

Mixed Gland Tablets, No. 1 (Male), contain Thymus Gland 2 grains, Thyroid Gland 1/5th grain, Pituitary (Anterior Lobe) ½ grain, Suprarenal Gland ¼ grain, Didymin ⅛ grain, Cerebrin ⅛ grain; **No. 2 (Female)** contain Thymus Gland 2 grains, Thyroid Gland 1/5th grain, Pituitary (Anterior Lobe) ⅛ grain, Suprarenal Gland ¼ grain, 'Varium' ¼ grain, 'Mamos' ⅛ grain, Cerebrin ⅛ grain.

For pluriglandular therapy in instances in which it is difficult to determine which gland constituent is at fault.

✱**Hormotone** (T.M. 365396) is described as a combination of hormones derived from the thyroid, pituitary, gonad and suprarenal glands. Each Tablet contains 1/20 grain of desiccated Thyroid and pituitary. *Dose.*—One or two tablets thrice daily before meals; not more than six per day. Stated to avour metabolism and increase mental, nerve, and muscular activity.—L. ./13,84. **Hormotone without Post-Pituitary.** Tablets are also made or use in neurasthenia associated with high blood pressure and all hypertensive onditions.

References to Thyroid Treatment.

Iodine (first found by Baumann in 1896), and Bromine, have been found n **sheep's thyroid glands.**

It is worthy of note that arsenic and iodine were used in the treatment f myxœdema long before these were found in the thyroid gland.

Numberless reports of the relief of myxœdema and cretinism have been ecorded. **Opinion varies as to its value in obesity.** Has been used successfully in lupus, psoriasis, in pityriasis rubra, ichthyosis and alopecia; and in enuresis.

Acromegaly improved.—B.M.J.E. i./96,51; L. ii./96,614.

Hæmophilia controlled by the liquor.—B.M.J. ii./00,1375.

In auto-intoxication of pregnancy and impending eclampsia. Full doses.—L. ii./03,307.

In arterio-sclerosis thyroid preparations are very useful.—B.M.J. i./06,121.

Hay fever:—1 to 3 tablets daily will benefit.—M.A., 1908, 37.

DERCUM'S DISEASE treated by 5 grain doses thrice daily. After two weeks reduced pain and alleviated numbness and tingling and reduced size of swelling.—B.M.J. ii./09,516.

CHRONIC SUBCUTANEOUS FIBROSIS treated by thyroid gland (or Liquid Extract of Fucus) diabetic diet, exercise and massage. Unless the obesity can be reduced, the prospects of improvement are slight.—B.M.J. i./11,354.

Obesity (*'Girdle' obesity and 'Froelich syndrome'*). *See also p.* 1078.

Treatment by Thyroid and Whole Pituitary Gland. *Tablets* of each gland (dried substance) are prepared, containing ½ grain, 1 grain, etc., up to 5 grains. Beginning with the smallest dose, 1 tablet of each is given, 3 times a day before food for 14 days. The dosage is increased each 14 days until a reduction in weight of 2½ lbs. weekly is obtained, and this dosage is continued until normal weight is restored. Disappointment with Pituitary medication by the mouth nearly always due to timidity in dosage; give suitable doses. Some have tried Anterior Lobe only, but the whole gland is apparently more satisfactory.

Thyroid in obesity in adolescents did good.—H. Gardiner-Hill, B.M.J. i./25,696.

The nervous excitation provoked by Thyroid medication to reduce weight, may last for weeks and be disastrous.—B.M.J.E. i./25,30.

Certain cases of obesity, adolescent goitre and defective goitre treated by giving thyroid and pituitary simultaneously.—H. Gardiner-Hill, B.M.J. ii./25,1057.

AMENORRHŒA.—The function of the thyroid is (just before onset of menstruation and early in pregnancy) to stimulate calcium excretion which may take place from the uterus or failing that from kidney or bowel.—B.M.J. i./09,597. Dysmenorrhœa and even amenorrhœa are often marvellously benefited.—H. Ewan Waller, Pr., Aug., '12,279.

RHEUMATOID ARTHRITIS. With mercurial inunction as adjuvant: remarkable results in a month.—B.M.J. i./10,1770; see also L. i./10,643.

Of 100 cases of rheumatic arthritis 70 felt distinct benefit after administration of combination of thyroid, pituitary, ovary and testes *per os*.—A. G. Watson, Pres., Nov. '26,411.

Menopausal arthritis should be treated with Thyroid ½–2 grains daily.—G. L. Kerr Pringle, Pres. Nov. '26,390. But J. H. Hannan, B.M.J. ii./27,15, says it should *not* be given at the menopause owing to its Adrenal sensitising action.

Tetany following an accidental overdose—possibly due to influence on Calcium metabolism.—B.M.J. ii./10,1523.

ECZEMA of infants. Suggestion for use in obstinate, and where the thyroid is thought to be functioning badly—well borne even by young infants and has proved successful.—Pres., June, 1911, p. 163.

"X" Rays on thyroid glands (Rabbits),—effects.—B.M.J. i./12,28.

ECLAMPSIA should be treated prophylactically with thyroid. Relief of giddiness, swelling and check to albuminuria pronounced.—B.M.J. i./13,1272.

The ultimate effect of the activity of the thyroid *in situ* is to raise the blood pressure, and the same result is produced by administering Thyroid. Gross misuse of Thyroid had occurred through its recommendation as a means of reducing blood pressure.—H. Ewan Waller, Pr., May, '13,881.

In SKIN AFFECTIONS, psoriasis, alopecia, ichthyosis and xerodermia of unknown origin palpate the thyroid. If the gland is smaller than usual try thyroid.—B.M.J. i./13,1037. Acne in youth is sometimes referable to hyperthyroidism.

A definite relation traced between the activity of the thyroid and certain skin diseases. Distinct improvement, *e.g.* in ichthyosis and eczema, following use of dried Thyroid and Calcium Chloride.—F. M. Pottenger, Endocrinol. Mar.-Apl. '26,105, per Pres., Oct. '26,343.

PSORIASIS.—Success is sometimes rapidly attained by the use of Thyroid 3 grains daily and externally Hutchinson's Paint (equal parts of Liq. Carbonis Detergens, Rectified Spirit, Lead Subacetate Solution, B.P.).—E. C. B. Ibotson, L. i./25,1182.

DUPUYTREN'S CONTRACTION believed to be indicative of thyroid insufficiency. Thyroid gland thought to have improved cases. 1½ grains daily and in one case 163 doses were given.—K. Black, B.M.J. i./15,328.

Hyper- and Hypo-Thyroidism.—The thyroid gland the storehouse for Iodine—without it the gland cannot functionate properly. Tincture of Iodine in treatment better than organically combined Iodides. In mastitis the large nodular masses in the breast often readily dispersed by Thyroid, Iodine and decalcifying agents. Enlarged prostate similarly treated. An account of Albert Abrams' methods.—Sir J. Barr, Pr., June, 1921.

The part played by the endocrine glands in the evolution of man.—Prof. L. Bolk, L. ii./21,588.

Endocrine insufficiency.—The neurasthenic discomforts of the climacteric in women treated by 1/10 grain B.P. Thyroid Siccum once daily. This is safe from risk of over-dose. DEAFNESS in old people has been well treated by a small dose twice daily. Epilepsy in women also; number of fits reduced. There would appear to be some close connection between endocrine insufficiency and poisoning from intestinal absorption. The addition of an intestinal antiseptic, *e.g.*, Benzonaphthol or Calomel or Ichthyol, is useful.—F. J. Sadler, L. i./22,930.

The thyroid is the gland of creation. Has anyone ever heard of a myxœdematous artist? Crichton Miller asks again for subthyroidic creators—be it of works of art or of children. The woman of artistic ability ceases to create works of art as soon as she is taken up with the maternal function.—B.M.J. ii./22,552.

Hypothyroidism and the 'vicious circle.' The forces of nature are often successful in breaking it. Owing, however, to the extraordinary instability of the thyroid, the reactions provoked by disease appear readily to paralyse the process of recuperation. In the case of the cretin the physician has a magic wand. In other cases the remedy is less striking, because the mischief is less apparent.—J. B. Hurry, Pr., April, '22,283.

Thyroid toleration. A patient with RAYNAUD'S DISEASE did not improve until '17 grains of thyroid gland' were given a day.—H. W. Barber, L. i./22, 453.

TERTIARY SYPHILIS.—Good results have been obtained with Thyroxin.—G. R. Murray, Clin. Jl., Aug. 1, 23,362. Young children treated.—Pres., May, '24,195.

PRURITUS VULVÆ well treated with dried Thyroid gland obtained direct from slaughter house, 0·1 Gm. being given *per os* daily. Pruritus completely ceased after 2 weeks treatment but returned after discontinuation of treatment. 0·05 Gm. of the dried Thyroid substance daily was found to keep the pruritus at bay.—A. Bregmann, per Clin. Jl., Nov. 28, 23,575.

Position of the thyroid gland in the endocrine system—a powerful activator of metabolism. Co-operates with the adrenals and pituitary and antagonises pancreas and parathyroids.—W. Langdon Brown, B.M.J. i./22,85.

GRAVES' DISEASE is usually secondary to some pre-existing chronic infection. It is usually associated with dental defects, tonsil and nasopharyngeal troubles; with rheumatism and with colonic disturbance. Give Tinct. Iodi Mitis 5 minims *t.d.*—H. Ewan Waller, Pres., Oct., 1922.

Hyperthyroidism is generally considered to be typically manifested in Graves' disease, and that many of its clinical symptoms are directly due to xcess of thyroid secretion is proved by the fact that removal of portions of he Thyroid gland materially lessens or entirely eliminates the ill effects of he excess. The clinical signs of Graves' disease are not primarily all due o the increased thyroid secretion. The protruding eyeball for instance is ow looked upon as the result of suprarenal excess.—H. Stanley Jones, Pres., Oct., 1922.

The problem of hypothyroidism, concerning the signs of which a small olume might be written, is the discovery of the underlying cause.—Pres., Oct., 22,314.

Infantile or adolescent myxœdema cured by Thyroid treatment—case escribed.—R. Hutchinson, per Clin. Jl., April 18/23,183.

Original doses used were too large. Of value for children who show failure to grow, nocturnal enuresis, night terrors, etc.—W. Langdon Brown, L. i./25, 739.

The thyroid apparatus is primarily concerned in controlling the direction of protein synthesis within the body, the thymus being the reserve store of nitrogen.—G. Scott Williamson, L. ii./23,1337.

ANTE-NATAL AND POST-NATAL INFLUENCES OF THE THYROID.—The presence of a living fœtus in the uterus appears to have a direct influence in exciting the thyroid into activity. It has been called the female gland because it plays a more important part in the physiology of the female than in that of the male. A woman may show few signs of hypothyroidism in pre-married life, but when put to the larger test of pregnancy the thyroid may fail adequately to respond. A liberal supply of thyroid hormone is most essential during gestation, and, if not forthcoming, disturbances of health are inevitable —affecting the mother, or fœtus or both. These disturbances can often be lessened or relieved by administration of thyroid substance. Thyroid deficiency may result in abortion, premature labour or abnormalities of the child. The comparative difficulty of rearing male children may be due to the fact that mothers of male children are unable to supply sufficient thyroid through their milk. Cow's milk varies in its Iodine content, and may be deficient in thyroid. Some cows persistently give a milk too low in Iodine content, and cow's milk in the summer shows a higher percentage of Iodine than in the winter. Hyperthyroidism in pregnancy, if not excessive, may be of advantage rather than otherwise. Disturbances in the thyroid function are the prelude to disorganisation of the functions of other endocrines.—H. Stanley-Jones, Pres., May, '24,180-182.

Thyroid medication apparently has a regulating effect on the calcium of the organism.—B.M.J. i./09,597. Theories have been promulgated to show that types of goitre depend on the relative proportions of Calcium and Iodine in the blood.—Pres., Oct., 22,360; May, '24,186.

Taking thyroid apparently caused disposition to chilblains. Any good in the past attributable to thyroid taking probably due to parathyroid contained.—D. C. Nasmyth, L. i./26,99. See also I. G. Cobb *ibid.* 260.

There is no foundation for the assumption that thyroid deficiency predisposes tuberculosis.—Coulaud, per Pres., May, '24,187.

Many cases of hyperthyroidism are diagnosed as neurasthenia and treated with tonics with little improvement. Determination of the B.M.R. will easily differentiate hyperthyroidism from other conditions.—H. W. Riggs, per Pres., May, '24,188.

Borax in small doses has been advised in hyperthyroidism, *v. p.* 12.

NEPHRITIS with œdema and albuminuria without hypertension.—Dried Thyroid 0·05 Gm. daily for several weeks, may give excellent results in.—Presse Med., Aug. 15,'25,1093, per Pres., May '26.187; Jl. A.M.A. ii./25,1010.

Manganese and thyroid treatment in pneumonia. see p. 553.

Tests for Thyroid Activity.

BASAL METABOLIC RATE ***(B.M.R.)*** means the rate of energy exchange in the body as seen under basal conditions (after elimination of movement, digestion, etc.). A relatively simple way of determination (as described by Benedict, Jl. A.M.A., July 23, 1921, p. 247, and Krogh, Brit. Ass. Rep., 1921, p. 445), is to measure the oxygen consumption of the patient during a given period. Air plus oxygen is rebreathed in a closed-circuit apparatus in which the exhaled CO_2 is absorbed, the diminution in volume of the gas indicates the amount of oxygen consumed. The B.M.R. does not vary as much as 10%. In hyperthyroidism it rises to 25 or 50% above normal, or even more; while in deficiency the rate falls below normal. To maintain it at normal, 12 to 14 mgr. of Thyroxin, Boothby has calculated, must be present in the system. The Thyroxin is used up at the rate of about 0·5 mgr. a day. In a case of myxœdema this amount would have to be given daily intravenously. The equivalent of Liquor Thyroidei (B.P. '98) estimated to be 10 minims or 5 grains of fresh gland.—Pres., Oct., 22,345; May, '24,192-195; L. i./23,131; G. R. Murray, Clin. Jl., Aug. 1, 23,362.

Determination and interpretation.—H. F. Moore, L. i./25,219.

Para-thyroid Gland.

These are four minute bodies embedded in the thyroid. According to Sir E. Sharpey Schafer their internal secretion possesses hormones which exert a powerful influence on the nervous system.

The glands are as essential to life as the thyroid. On experimental removal, in addition to causing tetany and death in a few days, the lime content in the tissues is reduced, there is increased Calcium and Nitrogen excretion, increase in amount of absolute and relative Ammonia in the urine and increase in the Ammonia content of the blood. It is also held that whilst thyroid secretion promotes metabolism parathyroid substance renders the products formed innocuous.

Physiology of the parathyroid gland.—Pres., May '26,192-4.

Uses.—Parathyroid is indicated in tetany, tetany of pregnancy. epilepsy, paralysis agitans, sprue (with Calcium Lactate), eclampsia and tetany of childhood.

Desiccated Para-thyroid Gland.

Dose.—1/60 grain (**0·001 Gm.**) to 1½ grains (**0·1 Gm.**) thrice daily.

The fresh parathyroid gland weighs on an average 0·09 Gm. This yields from 0·015 to 0·02 Gm. of desiccated powder, *i.e.*, 1=5 approximately of fresh substance.

Tablets contain 1/20 grain (0·003 Gm.), 1/6 grain (0·01 Gm.), ¼ grain (0·016 Gm.), and ½ grain (0·03 Gm.) Desiccated gland.

There is not enough Parathyroid in the country to keep one small manufacturing laboratory going.—H. H. Dale, L. ii./26,199.

Parathyroid Extract (Liquid) (Collip), may be prepared by treating the glands with 5% Hydrochloric Acid for one hour at 100°. The solution is made alkaline after removal of fat and proteins. Hydrochloric Acid is then added to give maximum precipitation, and the solution is filtered. It is suggested that the potency of Parathyroid extracts can be estimated by the rise in Calcium in blood-serum of dogs.—J. B. Collip, E. P. Clark and J. W. Scott, Jl. Biol. Chem., 63, Mar. '25, p. 395 ; 64, p. 485.

Parathyroid, ovary and pancreas require some special method of extraction to obtain active preparations. It is necessary to break up combinations with ipoids to get water soluble preparations. Collip's preparation is effective given *per os.*—Swale Vincent, B.M.J. ii./25,1055.

Collip's Parathyroid used in a case where parathyroid gland had been removed in error. Injections proved curative.—L. i./26,874.

Parathyroid has a sedative effect on nervous tissues and promotes healing rom effects of chronic sepsis. (Vines.) Collip appears to have isolated the ctive principle.—W. Langdon Brown, B.M.J. ii./25,1051.

Para-thor-mone-Lilly (Collip's Extract). An aqueous solution containng the active principles of parathyroid gland of cattle. Relieves symptoms f parathyroid tetany and increases Calcium content of blood serum. Claimed o be specific in tetania parathyreopriva and to relieve acute and chronic etany following thyroidectomy, so-called idiopathic tetany and infantile etany. Use may be attended by great danger unless due precautions are aken to avoid overdosage.—Pres., May '26,191.

Parathyroid contains no Iodine, and is thus distinguishable from Thyroid. —F. W. Gamble, Pres. Address B.P. Conf., 1923.

Endocrine factor in producing immunity and susceptibility of the teeth to aries. The parathyroids, *pars anterior* of the pituitary, medulla of suprarenal, with possibly the thymus gland, regulate absorption and fixation f Calcium, while the gonads (ovary and testes) and possibly the thyroid, egulate excretion.—F. W. Broderick, L. ii./21,1216. See also Ovarian gland.

Danger of overdosage. The hypercalcemia induced is not due to improved ssimilation but is the cause of an increased loss of Calcium. Not to be used promote Calcium assimilation, as it has the contrary effect.—Jl. A.M.A. /26,352.

Paroxysmal tachycardia. Parathyroid 1/10th gr. thrice daily used with markable effect.—C. Dukes, B.M.J. ii./21,987.

Elixir Parathyroid with Calcium Lactate, *Martindale.*

Dose.—1 drachm (4 Cc.), increased if necessary.

Contains 1/20 grain Dried Parathyroid Gland and 3 grains of Calcium Lactate in 1 drachm.

Calcium deficiencies treated by Parathyroid.—Varicose ulcers found to improve under intramuscular injection of Calcium salts up to a point but did not proceed to complete cure; under *Parathyroid*, healing was more rapid in cases at rest and in early cases. For these ulcers 1/10th grain of dried gland was given until laboratory tests showed that the ionised Calcium had returned to normal.—W. R. Groves and H. W. C. Vines, B.M.J. ii./21,40, 152,687; L. ii./21,1383; B.M.J. i./22,791. Leucocytic activity is stimulated. —*Ibid* i./23,106.

Results tend to confirm that parathyroid glands are regulators of Calcium metabolism, and that they act upon certain toxic substances, rendering them harmless. There is little evidence to indicate a relationship between the calcium factor and the detoxicating function, but clinical results show a parallelism between the restoration of the calcium balance of the blood and improvement in general health.—H. W. C. Vines, Pres., Oct. 1922,339.

By controlling Calcium metabolism the gland influences functions not only of the muscle and nerve tissue but probably of all organs. Dog experiments. —L. i./23,665. Tetany treated by Parathyroid. Some good results have been reported.—Prof. Swale Vincent, L. i./23,130. Tetany, following removal of right lobe of thyroid gland, benefited from subcutaneous injection of parathyroid 1/10th grain doses, and large doses of Calcium Lactate.—Davies, B.M.J. i./23,512.

Parathyroidectomised dogs can be kept alive without symptoms of tetany by diets containing (1) large amounts of lactose or (2) large amounts of Calcium salts. Parathyroid tetany considered to be due to an intoxication for which the proteolytic group of intestinal bacteria are responsible. The function of the parathyroid glands is to prevent intoxication by these poisons. These glands do not furnish a hormone necessary for life.—Pres., May, '24,199.

Found helpful in the treatment of benign ulcers, both internal and external, that is, gastric, duodenal and varicose ulcers. Useful in tetany and the condition of chronic toxæmia called latent tetany.—L. Williams, B.M.J. i./23,1010.

Parathyroid Preparations, Standardisation of by means of incubation with a known amount of ***Guanidine*** (excess of this can be shown in the blood and urine in tetany, and in animals Parathyroidectomised).—H. W. C. Vines, B.M.J. ii./23,559. *See also Vol. II.*

Sprue.—Parathyroid 1/10 grain twice daily, in conjunction with Calcium Lactate 10 or 15 grains 3 times daily, has been found to give excellent results. —H. Harold Scott, L. ii./23,876; B.M.J. ii./24,308, and V. Coates, *ibid.* 623.

But there is no statement that the author tried Calcium Lactate without the Parathyroid.—Prof. Swale Vincent, B.M.J. ii./25,1056. Vines says Scott obtained equally good results without Calcium at all, using the Parathyroid alone.—B.M.J. ii./25,1059.

Dried Gland preparations on the market are pharmacologically inactive.—Prof. Swale Vincent, L. i./25,739.

Sprue treated with 1/10 grain Parathyroid at night and 10 grains Calcium Lactate thrice daily with success.—C. F. Shelton, B.M.J. ii./25,844.

Several workers have submitted evidence of a relation between the parathyroid and the pancreas.—Pres., May, '24,200.

In view of the Calcium loss, characteristic of tuberculosis, it is suggested that parathyroid therapy should be a reasonable addition to the treatment of that disease.—Pres., May, '24,202.

Psoriasis treated by Parathyroid 1/10 grain once daily.—B.M.J. i./24,772.

In no single condition does the use of Parathyroid therapy rest on a foundation of scientific proof except in the case of transplanted glands in tetania parathyreopriva.—B.M.J.E., i./25,20.

Thyroidectin. *Dose.*—5 grains in capsules. The dried blood of thyroidectomised animals.

Has been given in Graves' disease on the theory that the serum of such animals contains substances which would neutralise the excessive formation of thyroid. **Thyroidectomised Goat's Milk** has also been used.

BLOOD TRANSFUSION.

The revival of this operation is due to the brilliant results achieved in the var. It enables loss of oxygen carriers and blood volume to be replaced.

In seriously ill persons before an operation, the administration of 200 to 500 Jc. of blood with a little Sodium Citrate added is resorted to. The mortality f influenza and pneumonia might be lessened by its use. Blood diseases, æmophilia, purpura hæmorrhagica are also treated. There is, however, an inompatibility of bloods of certain individuals. Two such incompatibles annot act as '*donor*' and '*recipient*' respectively.

Landsteiner's Law of iso-agglutinins was the outcome. There are present n human blood two agglutinable substances, A and B, which react with pecific agglutinins, *a* and *b*. If any blood contains an agglutinable substance, t will contain the agglutinin which reacts with the alternative agglutinable ubstance. Blood which contains A will contain *b* agglutinin and *vice versa.*

In consequence of further English and American work, numbers are used. 'hus, Group II. possesses the agglutinable substance A and agglutinin *b*, Group II. the agglutinable substance B and agglutinin *a*, Group IV. has both aggluinins but no agglutinable substance, and Group I. has both agglutinable ubstances A and B but neither agglutinin.

Landsteiner's Law is therefore: "In any blood there are always present gglutinins against the agglutinable substances absent from the same blood."

With samples of serum from known Groups II. and III. it is possible to est quickly any blood, and before a transfusion this has to be done. For ractical purposes the **corpuscles of the donor should not be agglutinated y the recipient's serum**, for although theoretically the donor's serum may gglutinate the recipient's corpuscles this serum is so largely diluted that his does not prove any great danger and need not be considered.

Since the corpuscles of Group IV. are agglutinated by no serum of any ther group, the members of this group are called 'Universal donors,' and enerally a Group IV. blood is chosen. See however S. C. Dyke, L. ii./27,910.

Directions for testing.—Into a tube as used for the Wassermann s placed a small quantity of N/10 sodium citrate in normal saline, and four or ive large drops of blood from finger, are added. On to one end of a micro lide is placed a drop of Group II. serum, and on to the other a drop of Group II. serum, to each of which is added a little of the corpuscle emulsion, each nixture being stirred with a glass rod and the slide gently rocked. If agglutiation occurs, it is visible to the naked eye, and appears as a deposit, the articles of which may get larger as more corpuscles are agglutinated until n some cases a few crimson dots float in clear serum.

Donors should be healthy males. Albuminuria, cardiac debility and narked obesity would exclude the donor on grounds of danger to himself. A wide mouthed bottle, graduated to 800 Cc. with fittings may be used.—E. F. Skinner, B.M.J. i./23,750. *See also* ii./25,516.

Alternative procedure.—Some blood is taken into a pipette from the ecipient and centrifugalized to separate the clot. A few drops of the donor's lood are taken into a 1·5% solution of Sodium Citrate and shaken up. A drop f the serum is mixed with a drop of the corpuscular emulsion on a slide and a over glass placed on it, the result being watched under low power. If no gglutination occurs in 5 minutes the donor's blood is suitable. No need o determine the group of either.—S Wyard, Clin. Jl., May 2/23,206.

Sodium Citrate 10 Cc. 2% should be added to each 100 Cc. of blood s collected and the mixture filtered through several layers of gauze.—H. Pritchard, B.M.J. i./27,793.

References.—Lists of 'Universal Donors' are kept.—H. Wallace Jones, Pr., Mar., 1921. Blood grouping and its clinical applications.—S. C. Dyke, L. i./22,579. *Malignancy and blood grouping.*—All four groups liable o malignant disease, but groups 1 and 3 peculiarly susceptible.—M.P.C., Nov./22,301; Brit. Jour. Exper. Path., 1921, Vol. 2, p. 66. Bladder tumour peration. Blood transfused by the citrate method. Result satisfactory. —F. Kidd, L. i./23,585.

Apparently saved the life of a woman with a burn covering more than 40% f the body surface.—Per Jl. A.M.A. ii./25,860.

The Kimpton-Brown method. A small amount of 3·8% Sodium Citrate sed in the tube before puncturing the vein.—W. B. Gabriel, L. i./26,1255.

Blood transfusion in treatment.—Sir H. Rolleston, B.M.A. Ann. Meeting, 926, L. ii./26,280. Technique: employing 100 Cc. of 4·5% Sodium Citrate 400 Cc. of blood. The difficulty is the clotting.—P. C. Gibson, L. ii./26,375.

TABLE OF INFECTIOUS DISEASES.

DISEASE.	INCUBATION.	QUARANTINE.	ISOLATION OF THE INFECTED.
Chickenpox	11 to 19 days.	20 days.	Until every scab has fallen—pay attention to scalp. *See also* Therap. Ind.
Diphtheria.	2 to 10 days.	→	When a bacteriological examination of the throat and nasal mucus has been carried out with negative results on three successive occasions at intervals of two days—no antiseptic applications having been made to the throat and nose for at least three hours before taking the swab (*Quarantine*). In no case for less than four weeks, and until convalescence is completed, so that there is no longer any sore throat, or any abnormal discharge from the throat, nose, ears, or eyes, no cutaneous pustulation and no albuminuria and that at least two successive bacteriological examinations of the pharyngeal and nasal mucus for the specific bacillus, made at intervals of not less than 2 days have been negative; each examination having been made not less than three hours after the discontinuance of local applications (*Isolation*).
Influenza	11 to 45 hrs	—	
Rubella (German Measles; Röteln)	9 to 18 days.	20 days.	For not less than seven days from the date of the appearance of the rash provided there is no persistence of nasal or other symptoms.
Epidemic Roseola	9 to 18 days.	20 ,,	Evidence strongly against the conveyance of infection by the air.—F. H. Thornton, L. i./16,342.
Morbilli (Measles).	10 to 14 days.	16 ,,	Four days is stated to elapse between the onset of disease and the rash. The quarantine period is three weeks and the period of isolation of the infected is three weeks from date of appearance of rash.—Elem. Sch. Regns. '26, L. ii./27,826. The head of the family and the medical practitioner *should* notify. *See also* L. i./21,1353.
Mumps.	14 to 23 days.	24 ,,	For not less than two weeks from the commencement—provided that one clear week has elapsed since the complete subsidence of all swelling. No exclusion from school is recommended for contacts.—Elem. Sch. Regns. '26.
Scarlatina (Scarlet Fever)	1 to 8 days.	10 ,,	For not less than four weeks from the date of the appearance of the rash, provided convalescence is completed, and there is no sore throat, discharge from the ear or nose, suppurating or recently enlarged glands, or eczematous patches.
Variola (Smallpox).	10 to 14 days.	16 ,,	Until every scab has fallen off, and the skin lesions have all healed. Isolation should be for 6 weeks or until certified free from infection.—Elem. Sch. Regns. '26.
Typhoid Fever	7 to 21 dys.	23 ,,	—
Typhus.	5 to 14 dys	14 ,	4 weeks.
Whooping Cough.	7 to 19 days.	21 ,,	Until the characteristic spasmodic cough and the whooping have ceased for at least two weeks, or in cases of persistent whooping in not less than six weeks from the commencement of the spasmodic cough.
Ringworm.	—	—	When the whole scalp, having been examined, not one broken off hair showing any of the forms of ringworm fungus is to be detected on microscopic examination.

Revised Code of Reguls. for Public Elemen. Schs. '26, and Administrative Memo. 51, '27.—L. ii./27,826.

POISONS

The Chemist and Druggist is legally qualified to supply poisons nd 'poisonous' substances—the latter being differentiated in their gal significance, *cf.* p. 1000—without a medical man's prescription. ı view of the exacting nature of the **Poisons and Pharmacy Act, 908** (8 Edw. 7, ch. 55), it is of importance to be able to determine ıe position of any poison in the Schedule thereto, which is in two arts. We provide the Schedule and further details of the Act. s in past Editions we show Part I. Poisons by means of the sign [P1] ıd those in Part II. by Ⓟ. These signs precede the names of the oisons—once, as a general rule, under its main heading.

In determining whether an alkaloid is a poison or not, we take the ose and the uses in each case into consideration; there are few ı the borderline between poison and non-poison.

A small amount of misuse of Cocaine has occurred in this country, ıt many of the reports are grossly exaggerated. The **Cocaine ıbstitutes** remain completely *unrestricted.* They are, further, not uched by the Dangerous Drugs Acts (*q.v.*).

As a further criticism, Mercuric Chloride cannot be bought by ıe public except under [P1] restrictions, but any quantity of aqueous lution (an ounce will dissolve in a pint) can be legally obtained a Ⓟ poison. In Northern Ireland, however, preparations of ıblimate *are* [P1].

Though the existing restrictions may be insufficient in small ırticulars, pharmacists are alive to the necessity of guarding against isuse of poisons, *which they alone are permitted to sell in open shop.*

Local authorities who license persons other than legally qualified emists, to sell **"Poisonous substances used exclusively agriculture or horticulture"** should realise the seriousness the duty entrusted to them. Facilities are granted for more sily obtaining arsenic and nicotine. Provisions are made for neral acids and soluble salts of oxalic acid to be labelled "Poison- s." According to the Act a body corporate, or in Scotland a m or partnership, may carry on the business of Chemist and uggist if the business is **under the control of a qualified super- endent.** Certificate of qualification of bona fide superintendent ıst be exhibited in the shop. The word Pharmacist can be ɜd by Chemists and Druggists but not by companies.

At a meeting of the B.M.A., before which Sir William Willcox read paper urging the need of more stringent control, it was resolved ıt the *sale of Arsenical preparations,* included in Section II. of Poisons and Pharmacy Act 1908 (*i.e., in the Schedule of Poisons*), uld be limited (1) on the part of the seller to properly qualified l competent *pharmacists,* and (2) on the part of the purchaser *hose who had obtained a licence* for the possession of such dangerous icles.—B.M.J. ii./22,374; P.J. ii./22,127.

he Poisons Schedule requires revision and simplification. It is unin- gible to any ordinary person.—Rutherford Hill, P.J., i./26,13.

mendment of the Pharmacy Act, defining Wholesale Sale, needed. iculties regarding Arsenicals and insecticides for agriculturists.— ., i/26,505.

ommission appointed to enquire into sale of poisons, retail and olesale: keeping, distribution and supply.—B.M.J., ii/26,266.

SCHEDULE OF POISONS.

Applicable to Great Britain.

(Under the Poisons and Pharmacy Acts as amended to date.

PART I. (marked $\boxed{P1}$ in our text.)

Not to be sold by retail unless the purchaser is known to, or introduced by some person known to, the seller who must be a registered Chemist and Druggist or registered medical practitioner; also *before delivery of the poison* entry to be made in poison-book of (1) date of sale, (2) name and address of purchaser, (3) name and quantity of article, (4) purpose for which it is wanted—attested by signature of buyer and if necessary of the person introducing him; and must be labelled with (1) name of article, (2) the word "Poison," (3) the proportion which the poison or poisons bears to the other ingredients, (4) name and address of seller. *See also* Regulations *re* bottles, etc., p. 1000.

Aconite, Aconitine and their preparations.

Alkaloids.—All poisonous alkaloids, not specifically named in this Schedule, and their salts and all poisonous derivatives of alkaloids. (*Altered March* 3, 1925.)

Arsenic, and (*all*) its preparations except preparations used exclusively in agriculture or horticulture for the destruction of insects, fungi, or bacteria, or as a sheep wash or sheep dip if the preparations are:

(1) Contained in a closed package or vessel distinctly labelled with a notice of the special purpose for which the preparation is intended; and

(2) Sold upon an order in writing given by or on behalf of a person, firm, or body corporate known to the vendor, and

(3) Purchased for the purpose of the trade or profession of such person, firm, or body corporate. (*Altered March* 3, 1925 *and August* 14, '26. *See* P.J. ii./26,102.) *See also* Arsenic Act.

Atropine, and its salts, and their preparations.

Belladonna, and all preparations or admixtures (except belladonna plasters), containing 0·1 or more per cent. of belladonna alkaloids.

Cannabis (the dried flowering or fruiting tops of the pistillate plant of *C. sativa*) and resins from it. (*Added March* 3, 1925.)

Cantharides and its poisonous derivatives.

***Coca,** any preparation or admixture of, containing 0·1 or more per cent. of coca alkaloids.

Corrosive Sublimate.

Cyanide of Potassium and all poisonous cyanides and their preparations.

***Diamorphine** (also known as **Heroin**), and all preparations or admixtures containing 0·1 per cent. or more of diamorphine. (*Added January* 3, 1921.)

Diethyl-Barbituric Acid and other alkyl, aryl, or metallic derivatives of Barbituric Acid, whether described as Veronal, Proponal, Medinal, or by any other trade name, mark, or designation, and all poisonous **Urethanes and Ureides.** (*These were transferred from Part II. to Part I. in* 1918).

Digitalin and all other poisonous constituents of Digitalis. (*Added March* 3, 1925.)

***Ecgonine,** and all preparations and admixtures containing 0·1 per cent. or more of ecgonine. (*Added January* 3, 1921.)

Emetic Tartar, and all preparations or admixtures containing 1 or more per cent. of Emetic Tartar.

Ergot of Rye and preparations of ergots.

Lead, in combination with Oleic Acid, or other higher fatty acids, whether sold as Diachylon or under any other designation (*except* machine-made Plasters). (*Added May 27th,* 1917.)

Nux Vomica, and all preparations or admixtures containing 0·2 or more per cent. of **Strychnine.**

***Opium,** and all preparations or admixtures, containing 0·2 or more per cent. of morphine. (*Altered Jan.* 3, 1921.) TINCTURA OPII (LAUDANUM) B.P. '14, is 1%.

Picrotoxin.

Prussic Acid and all preparations or admixtures containing 0·1 or more per cent. of Prussic Acid.

Savin and its oil, and all preparations or admixtures containing Savin or its oil.

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* *See also Dangerous Drugs Acts.*

Strophanthin and all other poisonous constituents of Strophanthus. (*Added March* 3, 1925.)

Tobacco, any preparations or admixtures containing the poisonous alkaloids of Tobacco, other than Tobacco for smoking or Snuff, and for use in horticulture, etc., if packed, sold, etc., as sections 1—3 under Arsenic. (*Added March* 3, 1925.) *See also* Arsenic Act.

PART II. (marked Ⓟ in our text).

Must be labelled with (1) name of article, (2) the word "Poison," and (3) the *proportion* of the poison, (4) name and address of seller who must be a registered Chemist and Druggist.

Almonds, Essential Oil of (unless deprived of prussic acid).
Antimonial Wine.
Barium Salts, all except the Sulphate. (*Added March* 3, 1925.)
Cantharides, tincture and all vesicating liquid preparations or admixtures of.

Carbolic Acid, and liquid preparations of, and its homologues containing more than 3% of those substances, *except* preparations for use as sheep-wash, or for any other purpose in connection with agriculture or horticulture contained in a closed vessel distinctly labelled with the word "Poisonous," the name and address of the seller, and a notice of the agricultural or horticultural purposes for which the preparations are intended. (For Order in Council *re* Liquid preparations containing not more than 3% of Phenols, see page 1000.)

Chloral Hydrate.

Chloroform and all preparations or admixtures containing more than 20% of chloroform.

Digitalis.
Mercuric Iodide.
Mercuric Sulphocyanide.
Oxalic Acid.

Poppies, all preparations of, excepting red poppy petals and syrup of red poppies (*Papaver rhœas*).

Precipitate, Red, and all oxides of Mercury.
Precipitate, White.
Strophanthus.

Sulphonal and its homologues, whether described as Trional, Tetronal, or by any other trade mark, name, or designation. (*Added April* 14, 1913.)

Zinc Chloride and liquid preparations of zinc chloride, *except* preparations ntended for soldering, or other purely industrial purpose, provided that they are contained in closed vessels labelled with the word "Poisonous" and bear the name and address of the seller and a notice of the special purpose for which the preparations are intended. (*Added January* 8, 1921.)

All preparations or admixtures *which are not included in Part I. of his Schedule, and contain a poison within the meaning of the Pharmacy Acts,* xcept preparations or admixtures the exclusion of which from this schedule is indicated by the words therein relating to carbolic acid and chloroform, and except such substances as come within the provisions of Section 5 of the Poisons and Pharmacy Act 1908.

Tobacco for smoking, or snuff and machine-spread Lead Plaster are *xcluded* from this clause (March 3, 1925).

Note.—The last paragraph in the Schedule brings into Part II. many preparations and admixtures not defined in the Schedule—in particular preparations and admixtures of vegetable drugs containing poisonous alkaloids should be borne in mind even though the drugs themselves are not in the Schedule. All such preparations are clearly indicated in our pages with the letter Ⓟ. *Reference should be made to the body of the book in cases of doubt.*

ORDERS IN COUNCIL.

Poisonous Substances. The Mineral Acids and Disinfectants.

Hydrochloric, Nitric and Sulphuric Acids.
Soluble Salts of Oxalic Acid.
Liquid Preparations containing more than 5% by weight of free Ammonia.
All Liquid Preparations sold as Carbolic, Carbolic Acid, Carbolic Substitutes, or Carbolic Disinfectant, containing not more than 3% of Phenols.

For each of these Poisonous substances see the body of the book.

These substances when sold by retail must be labelled:

(1). *With the name of the substance.*
(2). *"Poisonous" (not "Poison.").*
(3). *"Not to be taken."*
(4). *With the name and address of the seller, and any of them in liquid form must be in a bottle distinguishable by touch.*

The wording of the Order, it will be observed, specifies 'Phenols' whereas the wording in the Schedule of Poisons (Part II.) is CARBOLIC ACID *and its* HOMOLOGUES. *This wording is intended to apply also to* **Phenoloids** *where the word 'phenols' is used.*

In 1922 there were 148 deaths from unscheduled substances, of which nearly half were due to **Hydrochloric Acid.**—P.J., i/26,460.

Agricultural and Horticultural Poisons.

(*See also* p. 178.)

Chemists and Druggists sell these substances under the same laws as apply to other Poisons, *i.e.*, the Pharmacy Acts, 1868, the Poisons and Pharmacy Act, 1908, and, if they contain Arsenic, the Arsenic Act, 1851. Other persons may, if they obtain licences for this purpose from the local County or Borough Council, sell Agricultural and Horticultural Poisons under Section 2 of the Poisons and Pharmacy Act 1908, subject to the Regulations made by Order in Council of 2nd April, 1909, and amended 1920, which require that "all poisonous substances shall be kept in a separate drawer or closed receptacle" and "sold at a separate counter" or "part of counter," that "A poisonous substance shall not be sold except in a closed vessel or receptacle as received from the manufacturer, which vessel or receptacle must be of sufficient strength to withstand rough usage, securely closed and free from leakage, and distinctly labelled with the name of the substance and the word 'Poison,' and with the name and address of the seller, and with a notice of the special purpose for which it has been prepared," and that "Each bottle, tin, drum, or cask shall have the word 'Poisonous' indelibly printed, marked, or branded in easily legible characters in a conspicuous position apart from the label, and the label must bear the word 'Poison.'" Further the bottles must be distinguishable by touch from ordinary bottles. Note particularly Section 2 of the 1908 Act, "nothing exempts any person so licensed from the requirements of the 1868 Act and the Arsenic Act.'

Provisions almost identical apply to Ireland (both Northern Ireland and the Free State).

Regulations for the Keeping, Dispensing, and Selling of Poisons in Great Britain.

(*Prescribed by the Pharmaceutical Society and approved by the Privy Council.* These regulations, therefore, ***form part of the 1868 Act*** in pursuance of Section 1 of the Act.)

1. That in the keeping of poison each bottle, vessel, box, or package containing a poison be labelled with the name of the article, and also with some distinctive mark indicating that it contains poison.

2. Also that in the keeping of poisons each poison be kept on *one or other* of the following systems, viz.:—

(*a*) In a bottle or vessel tied over, capped, locked, or otherwise secured in a manner different from that in which bottles or vessels containing ordinary articles are secured in the same warehouse, shop or dispensary; or

(*b*) In a bottle or vessel rendered distinguishable by touch from the bottles or vessels in which ordinary articles are kept in the same warehouse, shop, or dispensary; or

(*c*) In a bottle, vessel, box, or package kept in a room or cupboard set apart for dangerous articles.

3. That in the dispensing and selling of poisons all liniments, embrocations, lotions, and liquid disinfectants containing poison be sent out in bottles rendered distinguishable by touch from ordinary medicine bottles, and that there also be affixed to each bottle (in addition to the name of the article and to any particular instructions for its use) a label giving notice that the contents of the bottle are not to be taken internally.

WHOLESALE TRADING.

Wholesale trading is exempt from the provisions of Sections I.—XV. of the Pharmacy Act, 1868, *to which reference must be made.*

Attention is specially drawn to Section 17 *of the Act*:—

> "*It shall be unlawful to sell any poison* **either by wholesale or retail** *unless the box (etc.) is labelled with the name of the article and the word Poison and name and address of Seller . . . but the provisions of this Section shall not apply to Sales* **by wholesale dealers to retail dealers** *in the ordinary course of wholesale dealing.*"

SALES TO MEDICAL MEN.

These are now governed by Section 3 of the 1923 Dangerous Drugs and Poisons (Amendment) Act, *q.v.*

P1 POISONS THROUGH THE POST.

(*To Medical Men, etc.*)

This matter, which, in the past, caused pharmacists misgivings is now dealt with by the 'Amendment as to Dealing with Medical Men in P1 Poisons in general' in Section 3 of the Dangerous Drugs and Poisons (Amendment) Act, 1923, see page 1012, to which reference should be made.

SALE OF ARSENIC.

(*Applicable to Great Britain and Northern Ireland and the Irish Free State*).

On every sale of Arsenic, *in addition* to the requirements of the Poisons and Pharmacy Act, 1908 ***(see Poisons Schedule),*** the following provisions of the Arsenic Act (1851) are to be observed. Particulars of sale to be entered in a book by the seller as follows:—

Date of Sale.	Name and Surname of Purchaser.	Purchaser's place of abode.	Condition or Occupation.	Quantity of Arsenic sold.	Purpose for which required.

(Purchaser's signature.) (Witness.) (Seller's Signature.)

Or if purchaser cannot write, seller to put the words "cannot write."

No person shall sell Arsenic to any person who is unknown to the person selling such Arsenic, unless the sale be made in the presence of a witness who is known to the person selling the Arsenic, and to whom the purchaser is known, and who signs his name, together with his address, to such entries before the delivery of the Arsenic to the purchaser, and no person shall sell Arsenic to anyone under full age. The orders from retailers to wholesalers must be *written.*

The Arsenic if colourless ***must be coloured with*** at least $\frac{1}{16}$ of its weight of ***Indigo or Soot,*** unless sold in a quantity of not less than 10 lbs. and for a purpose (*not* for use in agriculture) for which such admixture would render it unfit.

The penalty for offending against the Act is a fine of not exceeding £20

The Act is not to prevent sale of Arsenic in medicine under a prescription of a legally qualified medical practitioner.

"Arsenic" includes **Arsenious and Arsenic Compounds,** and all other colourless preparations of same.

LABELLING OF POISONS ORDER, 1924.

Pursuant to Section 4, *Sub-section* 2, *of the Dangerous Drugs and Poisons* (*Amendment*) *Act,* 1923.

In force since January 1st, 1926.

The *name* of the poison and the *proportion* which the poison (or poisons), bears to the other ingredients in every preparation must be stated, as percentage or otherwise, thus altering Section 17 of the Pharmacy Act '68 to that extent. B.P. or B.P.C. preparations sold with or without dilution need have only a reference to these works and when sold with dilution the proportion to the total ingredients. In the case of pills, tablets, cachets, and similar medicaments the label must show the *amount* in each and the number in the container. This does not apply to *Dispensing.*

The late Sir William Glyn-Jones suggested that the decisive test to be *applied by pharmacists* in any case is given by the question: 'Is this article, as I sell it, an article *the sale of which is by the Pharmacy Acts confined to Pharmacists?*' If the answer is yes, it comes within the Labelling Provisions and the Order applies. Ammonia and other 'poisonous' substances are outside the Order.—P.J. ii./25,716.

SCHEDULE OF POISONS APPLICABLE TO IRISH FREE STATE.

[*In accordance with the Sale of Poisons* (*Ireland*) *Act*, 1870, *and Amendments by Orders in Council.*]

PART I

Aconite and its preparations.

Alkaloids,—see Strychnine.

Arsenic and its preparations.

Cantharides.

***Coca,** any preparation or admixture of, containing 0·1 *or more* per cent. of coca alkaloids (*Added Dec.* 8, 1921.).

Corrosive Sublimate.

Cyanide of Potassium and all metallic cyanides.

***Diamorphine** (also known as heroin) and all preparations or admixtures containing 0·1 per cent. of diamorphine. (*Added Dec.* 8, 1921.)

***Ecgonine** and all preparations or admixtures containing 0·1 per cent. of ecgonine (*Added Dec.* 8, 1921.)

Emetic Tartar.

Ergot of Rye and its preparations.

***Opium,** and all preparations or admixtures containing 0·2 or more per cent. of ***Morphine.** (*Added Dec.* 8, 1921.)

Prussic Acid.

Savin and its oil.

Strychnine and all poisonous vegetable alkaloids and their salts.

PART II.

Almonds, Essential Oil of, unless deprived of its prussic acid.

Ammoniated Mercury.

Belladonna and its preparations.

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* *These also apply to Dangerous Drugs Acts in N. Ireland and Irish Free State.*

Cantharides, the tincture and all vesicating liquid preparations of.
Chloral Hydrate and all its preparations.
Chloroform.
Corrosive Sublimate, Preparations of.
Diethylbarbituric Acid and other alkyl, aryl, or metallic derivatives of barbituric acid, whether described as Veronal, Proponal, Medinal or by any other trade name, mark or designation; and all poisonous urethanes and ureides. (*Added July*, 1914.)
Ether, Sulphuric.
Mercury, Biniodide of.
Mercury, Red Oxide of.
Morphine, Preparations of.
Nux Vomica and its preparations.
Opium and all preparations of opium or **poppies**.
Oxalic Acid and all **oxalates.**
Phenol, commonly called carbolic acid.
Phosphorus and all preparations containing it in a free state.
Poppies, all preparations of (See Opium).
Strychnine, Preparations of.

Every Compound containing any of the poisons mentioned in this Schedule when prepared or sold for the destruction of vermin.

As regards the sale of Agricultural and Horticultural Poisons and Soluble Oxalates—*vide* Arsenic, p. 178, *vide* also Acid Hydrochloric, p. 42, Acid Nitric, p. 60, Acid Sulphuric, p. 92, Acid Oxalic, p. 61, and Ammonia, p. 148, *vide* also Orders in Council p.p. 1000, 1001.

NORTHERN IRELAND.

The Pharmacy and Poisons Act (N. Ireland), 1925.

The Poisons Schedule of this Act is similar to that of Great Britain, excepting Part I. '**Preparations of Corrosive Sublimate**' in addition to Corrosive Sublimate: Sulphuric Ether: Chloral Hydrate and its preparations: as to Arsenic and Tobacco, the alterations of March '25 and August '26 do not apply. Part II.: Phosphorus and all preparations and admixtures containing it in a free state.

The Arsenic Act 1851 applies, as also the 1920 D.D.A., excepting provisions as to 'lock and key.'

Regulations as to Sale of 'Poisonous' Substances and Agricultural Poisons differ to an extent from those in Great Britain.

'Known to the seller.'—The knowledge should be sufficient to enable the seller to judge of the accuracy of the name and address which the purchaser gives, or to give the authorities sufficient data to enable them to identify the purchaser. (Quoted from Glyn-Jones 'The Law of Poisons and Pharmacy,' *re* Potassium Cyanide refused to be supplied to a medical man to kill wasps).—P.J. ii./22,276, Medical Press, Sept. 6th, 1922.

Colouring of poisons.—Distinctive colours for each suggested.—F. A. Hocking, P.J. ii./22,349,598.

COCAINE IN DENTISTRY.

The temporary Regulations for the use of Cocaine preparations in dentistry we gave at length in our 17th Edn., p. 951. The position is now fully covered by the Dangerous Drugs Acts (*q.v.*) and the Dentists Act, 1921.

SUMMARY OF THE DANGEROUS DRUGS ACTS.

The following is merely a *brief summary* of the requirements of the Acts concerning prescribing and dispensing. (All having dealings with these drugs should study all the details provided subsequently.)

The Acts apply to:—

Opium **Morphine and its Salts**	Preparations containing 0·2% or more of Anhydrous Morphine.
Diamorphine ('Heroin'), **Cocaine, Ecgonine and all their Salts**	Preparations containing 0·1% or more of the alkaloidal bases.

A prescription for these drugs must show:

(1) Patient's name and address.
(2) Date.
(3) Total amount of the drug ordered (unless a preparation of the B.P., B.P.C., or N.H.I. Drug Tariff when the amount of the *preparation* may be given).
(4) Prescriber's usual signature (not initials).
(5) Prescriber's address.
(6) If the prescriber so requires, the intervals up to three, at which the prescription may be repeated.

Dental Prescriptions marked 'For local dental treatment only.'
Veterinary Prescriptions marked 'For animal treatment only.'

In Dispensing the Pharmacist must:

(1) Know the signature.
(2) Be satisfied that the prescription is genuine. If possible make sure that the medical practitioner, dentist or veterinary surgeon is on the Register.
(3) Mark prescription with date of dispensing.
(4) Retain prescriptions 2 years, in order, tied together.
(5) Make record in book (D.D.A.), on the day or next day, and copy in Prescription Book.

Supplies to Medical Men (etc.).

This applies both to wholesale and retail. See Section 3 of 1923 Act.

All Sales of Dangerous Drugs (including preparations) *and Part I. Poisons* to be entered in Poisons Book and the *signed order* to be retained 2 years. There must be name and address (and date) and the nature and amount of the poisons.

Chemist must be satisfied as to genuineness.

If by post must be by *Registered Post.*

In *addition*, entry to be made in Cocaine, etc. Registers.

Medical men may only have Dangerous Drugs so far as is necessary for the practice of their profession.

The stock of dangerous drugs must be kept in a locked cupboard. The key is to be kept by the chemist or a qualified assistant.

Delivery to messengers. Note Regulation 13 to Statutory Rules, 1921, No. 865, *i.e.* as Sect. 7 under Raw Opium, page 1006.

DANGEROUS DRUGS ACT—1920.

(10 & 11 GEO. V., CHAPTER 46.)

Salient points from the 1923 Act are incorporated where necessary.
D *Throughout our pages means drugs or preparations coming vithin the provisions of these Acts.*

PART I.—*Sections* 1 *to* 3 relate to Importation into and Exportation from he United Kingdom* of Raw Opium.

PART II.—Prepared Opium (*Section* 4). Import and Export *totally* and nconditionally prohibited. *Section* 5.—Any person manufacturing, selling r dealing in, or having in possession prepared Opium, being occupier of remises used for preparation of Opium for *smoking*, or sale or smoking of repared Opium, or being concerned in managing of premises used, or having ipes or utensils, or smoking or frequenting a place used for smoking, is guilty f offence against this Act.

PART III.—Cocaine, Morphine, etc. (as detailed in Section 8). *Section* 6. —Import and Export prohibited, except under licence. *Section* 7, Sub-ection 1. Manufacture, sale and distribution to be limited to persons licensed r otherwise authorised.

Sub-section 2.—Authorisation—under this section—of persons keeping pen shop under the Pharmacy Act 1868 (as amended 1908).

Sub-section 3.—Nothing herein derogates from the provisions of the ?harmacy Act 1868, as amended 1908.

Section 8, Sub-section 1.—The drugs to which this part of the Act applies re ***Morphine, Cocaine, Ecgonine,*** and ***Diamorphine*** and ***Vedicinal Opium. See*** S. R. & O. p. 1007.

Sub-section 2.—By Order in Council this part of the Act *may* apply to ew derivatives of Morphine, Cocaine, or alkaloids or other drugs, in the ame manner.

(The calculation of percentage is dealt with under Section 5 of the 1923 ct, *q.v.*)

PART IV.—*Section* 9, Sub-section 1.—Application of Customs Acts.

Section 10, Sub-section 1.—A constable or person authorised by a Secretary f State has power to inspect books or documents relating to dealings and tocks (see also Amendment in the 1923 Act). Sub-section 2.—Any person lelaying, or obstructing, or failing to produce, or concealing, or attempting o conceal books, stocks, drugs or documents shall be guilty of an offence an Amendment made in the 1923 Act is included herein).

Section 11.—Refers to regulations which may be made under this Act.

Section 12.—Refers to Licences (including payment of a fee).

Section 13.—On indictment (Assizes or Quarter Sessions) or Summary Conviction heavy punishments involved and the offender's authorisation nay be withdrawn.

Sub-section 2B.—(FROM THE 1923 ACT.) If any person attempts to commit n offence, or solicits or incites another person to commit it, he shall, without rejudice to any other liability, be liable on summary conviction to the same unishment and forfeiture as if he had committed it.

Sub-section 2C.—(FROM THE 1923 ACT.) Where a person convicted of n offence is a *company*, the chairman and every director and every officer oncerned in the management of the company shall be guilty of the like ffence unless he proves that the act constituting the offence took place vithout his knowledge or consent.

Sub-section 3.—Refers to time of bringing proceedings both against a company and also (from the 1923 Act) against a person *attempting* or *soliciting* r *inciting* another person to commit the offence.

Section 15, Sub-section 1.—

"**Raw Opium**" includes powdered or granulated Opium, but does *not* nclude medicinal Opium.

"**Prepared Opium**" means prepared for smoking including dross and residues remaining after Opium has been smoked.

Medicinal Opium" means raw Opium artificially dried. (A better definiion appears in the 1925 Act, *q.v.*)

*** U.K. includes Great Britain, Northern Ireland, and the Isle of Man, ut excludes the Irish Free State and the Channel Islands.**

Section 16.—In application to Ireland the Act has effect subject to :—

(*a*) A reference to the Poisons (Ireland) Act, 1870, the Pharmacy (Ireland) Act, 1875, and the Pharmacy (Ireland) Act 1875 (Amendment), Act, 1890, being substituted for any reference to the Pharmacy Act, 1868; **and**

(*b*) Reference to the Pharmaceutical Society of Ireland being substituted for the Pharmaceutical Society of Great Britain.

STATUTORY RULES AND ORDERS (S.R. & O.), (MAY 20), 1921, NO. 864, CONCERNING

RAW OPIUM.

(*In this Summary of the Acts, Rules and Orders, 'medical practitioner' means 'duly qualified, i.e., registered medical practitioner'; 'dentist' means 'registered dentist'; 'veterinary surgeon' means 'registered veterinary surgeon.'—W. H. M.*)

Sale and Distribution.

1. No person shall supply or procure, or offer to supply or procure Raw Opium to or for any person whether in the United Kingdom or elsewhere, or shall advertise Raw Opium for sale—(*a*) unless licensed or authorised; or (*b*) otherwise than in accord with the terms and conditions of the licence or authority.

2. No person shall supply or procure, or offer to supply or procure Raw Opium to or *for any person who is not licensed* or authorised to be in possession of it.

Possession.

3. No person shall be in possession or attempt to obtain possession of Raw Opium (added by Order of October 2, 1922) unless (*a*) licensed to import or export, or (*b*) licensed or authorised to supply, or (*c*) otherwise licensed or authorised to be in possession of it.

Records.

4. A person who supplies Raw Opium shall (*a*) enter in a register kept for the sole purpose all supplies purchased or obtained and all dealings effected (including sales or supplies to persons outside the U.K.) as shewn in the schedule; (*b*) make entry with respect to purchases on the day it is received and with respect to sales or supplies by him on the day on which the transaction is effected; or if not reasonably convenient on the day following; (*c*) if he carries on business at more than one address keep a separate register for each set of premises; (*d*) keep the register available for inspection; (*e*) not cancel, obliterate or alter any entry or make any untrue entry. Any mistake in an entry may be corrected by a marginal note or footnote giving the correct particulars and dated.

The registers are to be kept 2 years from date of last entry (S.R. & O., OCT. 2, 1922, NO. 1086).

General Authorisations. See p. 1009.

Delivery to Messengers.

7. Delivery shall not be made to a person not licensed or authorised to be in possession who *purports to be sent* by or *on behalf* of a licensed or authorised person unless he produces an authority in writing, signed by the person licensed or authorised to receive it on his behalf and unless the person supplying is satisfied that the authority is genuine. (In the case of Raw Opium there is ***no exemption*** for prescriptions.)

"*Possession.*"

8. Raw Opium in the order or disposition of anyone is deemed to be in his possession.

Application to Ireland.

9. As under Section 16 (*a*) of the Act, *q.v.*

S.R. & O. 1921, MAY 20, 1921, NO. 865.

MORPHINE, COCAINE, MEDICINAL OPIUM, etc.

Summary of Regulations under Section 7 *of the* 1920 *Act for controlling the manufacture, sale, possession and distribution of*

Morphine, Cocaine, Ecgonine and Diamorphine *(commonly known as Heroin) and their respective salts and* ***medicinal opium,*** *and any admixture, extract or other preparation or substance containing not less than* ***one-fifth of one per cent. of Morphine or one-tenth of one per cent. of Cocaine, Ecgonine or Diamorphine.***

Application.

1. **The drugs to which these** Regulations apply are stated in the heading. The percentage in the case of Morphine is calculated as in respect of anhydrous Morphine.

Manufacture.

2. No person shall manufacture or carry on any process in the manufacture of Morphine, Cocaine, Ecgonine or Diamorphine, or their salts, or medicinal Opium—(*a*) unless he is licensed or authorised by these Regulations or by any authority granted by the Secretary of State to do so; (*b*) except on licensed premises; (*c*) otherwise than in accordance with the licence or authority.

Sale and Distribution.

3. No person shall supply or procure or offer to supply or procure any of the drugs to or for any person whether in the United Kingdom or elsewhere or shall advertise any of the drugs for sale—(*a*) unless licensed or authorised by these Regulations or by the Secretary of State to supply the drug or unless licensed to import or export or unless licensed or otherwise authorised to manufacture the drug or (but so far only as regards procuring the drug) unless he is licensed to procure the drug* or (*b*) otherwise than in accord with the licence or authority.

4. *Except* when the drugs are dispensed in pursuance of a ***prescription*** given by a medical practitioner, dentist or veterinary surgeon, or are supplied by a medical practitioner or veterinary surgeon *who dispenses* his own medicines, in accord with the conditions specified below, no-one shall supply, procure, or offer to supply or procure the drugs to or for any person in the U.K. who is not licensed or authorised to possess them nor to anyone licensed or authorised except in accord with the terms of the licence or authority.

Administration by or under the direct *personal supervision* of a medical practitioner or by or under the direct personal supervision of a dentist in dental treatment, or by or under the direct personal supervision of a veterinary surgeon in the treatment of any animal, shall *not* be deemed supplying the drug.

(The Secretary of State may also direct that this exception shall not apply in respect of prescriptions supplied by a medical practitioner, dentist, or veterinary surgeon ***whose authorisation has been withdrawn.*** —D. D. Regs. 1926, Sec. 6.

A practitioner, etc., shall not give a prescription for the supply of any of the drugs if a direction as above has been given.—D. D. Regs. 1926, Sec. 6).

Giving and Dispensing of Prescriptions.

5. **A prescription must comply with the following:—**

It must be ***in writing,*** must be ***dated*** and ***signed*** by the medical practitioner, dentist or veterinary surgeon, with his ***usual signature*** and address, and must specify the ***name and address of the person*** for whose use the prescription is given, and the ***total amount*** of the morphine, cocaine, ecgonine or diamorphine or salt thereof to be supplied, except that in the case of a preparation in the ***B.P., B.P.C. or Drug Tariff for N.H.I.*** purposes and which is ***not combined with any other preparation*** of any of the drugs not so contained, it shall suffice to state the total amount of the ***preparation and (1926 D.D. Regulations,*** *Ref.* P.J. ii./26,243) ***except*** that in the case of prescriptions used for ***N.H.I. purposes*** on the form provided by the Insurance Committee the medical practitioner's address need not be marked on the prescription.

A prescription may only be given by a practitioner ***when required for purposes of treatment*** (1926 D.D. Regulations).

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*Note S.R. & O. 1923, No. 312.

A ***dentist*** may give a prescription for ***dental treatment*** only and it must be marked "***For local dental treatment only.***"

It shall only be given by a ***veterinary surgeon*** for the purposes of treatment ***of animals*** and shall be marked "***For animal treatment only.***"

The Regulations contemplated the issue of an official form of prescription but no such form has been issued.

A medical practitioner who dispenses any of the medicine shall enter particulars in his day book or in the register specified below.

6. ***The Dispenser must:—***

(*a*) Only dispense the prescription if it is on an official form (if prescribed) or is acquainted with the person ***for whose use*** the prescription is given and has no reason to suppose that the prescription is not genuine.—***If an official form is not prescribed*** (*none* has been issued) a prescription for any of the drugs shall only be dispensed if the dispenser is ***acquainted with the signature*** of the medical practitioner, dentist or veterinary surgeon by whom the prescription purports to be given, and has no reason to suppose that the prescription is not genuine; or if he has taken ***reasonably sufficient steps*** to ***satisfy himself*** that the prescription is ***genuine.***—S. R. & O. 1923, No. 312.

(*b*) The drugs must not be supplied ***more than once*** on the same prescription, unless the prescription so directs; if it so directs, the drugs may be supplied on not exceeding ***three*** occasions, as directed in the prescription, at the ***intervals specified*** in the prescription. This does not authorise a treble quantity on one occasion.

(*c*) The ***prescription must be marked with the date on which it is dispensed,*** and shall be ***retained for 2 years*** (added 2nd Oct. 1922) by the person, firm or body corporate dispensing it, and (unless for N.H.I. purposes on the form provided by the Insurance Committee) shall be ***kept on the premises*** where it is dispensed and ***shall be available for inspection.***

Possession.

7. No person shall be in possession or *attempt* to obtain possession (added 2nd Oct. 1922, S.R. & O. 1087) unless—(*a*) licensed to import or export or (*b*) licensed or authorised to manufacture or supply or (*c*) licensed or authorised to be in possession, or (*d*) he proves that the drug was supplied for his use by a practitioner or veterinary surgeon or in accord with a prescription.

The last foregoing provision does not apply to any drug supplied to a person for his use by a practitioner or in accord with a prescription if the person was at the time of the supply receiving any of the drugs ***in the course of treatment for addiction*** or otherwise from a medical practitioner and ***did not disclose this fact*** before the drug was supplied to him by the first-mentioned practitioner.—D.D. Regs. 1926, Sec. 2.

For a recent case see p. 1015.

Marking of packages or bottles.

8. (I.) Morphine, Cocaine, Ecgonine, Diamorphine or their respective salts or any medicinal Opium packages or bottles must be plainly marked with the ***amount of the drug*** contained.

(II.) Preparations, admixtures, extracts or other substance containing any of the last-mentioned drugs and coming within the Regulations shall not be supplied unless the package or bottle is plainly marked:—

(*a*) In the case of a powder, solution or ointment with the total ***amount*** contained ***and the percentage*** of the drug in the powder, solution or ointment;

(*b*) In the case of ***tablets*** or other articles with the amount of the drug in ***each article*** and the number of articles in the package or bottle.

This Regulation shall ***not apply when dispensed*** by a medical practitioner or on his prescription.

Records.

9. Every person who supplies any of the drugs shall—

(*a*) ***Enter in a register*** kept for the sole purpose ***all supplies*** purchased or obtained and all dealings in the drug effected by him (including sales or supplies to persons outside the U.K.) as shown in Schedule 1 *infra.*

(*b*) Separate registers or separate parts of the register shall be used for (*a*) Cocaine and Ecgonine and substances containing them, (*b*) Morphine and substances containing it, (*c*) Diamorphine and substances containing it, (*d*) medicinal Opium; provided that with the approval of the Secretary of State separate registers may be kept for separate departments of a business;

(*c*) Make the entry as to the drugs purchased or obtained by him ***on the day*** on which the drug is ***received*** and as to any ***sale*** or supply by him of it ***on the day*** on which the transaction is effected; ***or*** if not reasonably convenient on the ***day following;***

(*d*) Keep a separate register or registers in respect of each set of premises if there is more than one;

(*e*) Keep the register or registers in some part of the premises and at all times so as to be available for inspection.

(*f*) Not cancel, obliterate or alter any entry or make therein any entry which is untrue. Any mistake in an entry may be corrected by a marginal note or footnote giving the correct particulars and dated;

(*g*) Furnish to any person authorised by the Secretary of State, *e.g.*, a police constable, information as to stocks and transactions.

A *medical practitioner* who records in a day book particulars of supplies by him to patients with name and address of the patients and date of supply, may, in lieu of keeping the register required by this Regulation of drugs sold or supplied by him, enter separately for each of the drugs in a book to be kept for the purpose *references* under the appropriate dates to the records in the day book of any supply of the drug. *A person keeping open shop* for the retailing of poisons may in lieu of keeping the register required by this Regulation of drugs supplied by him enter separately for each of the drugs in a book kept for the purpose *references* under the appropriate dates to the entries in the "Poisons Book" or "Prescription Book" kept by him in pursuance of Section 17 of the Pharmacy Act, 1868, relating to any supply of the drugs. Such books shall be available for inspection. Prescriptions, Records, Registers, etc., to be preserved for 2 years—addition Oct. 2, 1922.

Every medical practitioner, etc., must enter in a Register kept for the sole purpose particulars as to ***each supply of each of the drugs purchased or otherwise obtained.***—D. D. Regs. 1926, Sec. 3.

General Authorisations.

10. Any person lawfully keeping open shop for the retailing of poisons is authorised :—

(*a*) to manufacture at the shop in the ordinary course of his retail business any preparation, admixture or extract of any of the drugs;

(*b*) to carry on at the shop the business of retailing, dispensing or compounding the drugs, but subject to the provisions of these Regulations.

Persons authorised to manufacture, sell, or distribute the drugs shall keep same in a ***locked receptacle*** of which ***the key shall be kept by himself or a qualified assistant.***—D. D. Regs. 1926, Sec. 7.

This refers, of course, to all *preparations*, also *e.g.*, Tinct. Opii and 'Chlorodyne' B.P. '85. They must not be on the shelves in the dispensary.

11. Any medical practitioner, or dentist or veterinary surgeon or any person employed or engaged in dispensing medicines at any public hospital or other public institution being a person duly registered under the Pharmacy Acts or any person in charge of a laboratory for research or instruction attached to any University, University College, Public Hospital or other Institution approved by the Secretary of State, or any person ***appointed*** by a local authority with the approval of the Minister of Health ***as an analyst*** for the purposes of the Sale of Food and Drugs Acts, 1875 to 1907, ***is authorised so far as is necessary for the practice of his profession*** or employment in such capacity to be in possession of and supply the drugs.

12. Authorisation may be withdrawn in event of an offence.

Delivery to Messengers.

13. On the lines of Raw Opium, *q.v.* This Regulation does not apply to dispensed medicines.

Possession.'

14. On the lines of Raw Opium, *q.v.*

Ships.

15. In the case of a *Merchant* ship not carrying a medical practitioner the master of the ship is an authorised person so far as is necessary to comply with the Merchant Shipping Acts. He may, subject to conditions prescribed by the Secretary of State, administer and supply the drugs to any member of the crew in accordance with instructions prepared or sanctioned by the Board of Trade. The keeping of a record of the use of the drugs in the official log in accord with the Merchant Shipping Acts shall comply with these Regulations as to keeping records.

S.R. & O. 1923, Sept. 10, No. 1095 :—The following words are to be added :—

"If a *foreign* ship in any port in Great Britain requires to obtain a supply of any of the drugs in order to complete the necessary equipment of the ship, the master of the ship is authorised to purchase and be in possession of such quantity of any of the drugs as may be certified by the Medical Officer of Health of the Port where the ship is (or in his absence by the Assistant Medical Officer of Health of the Port) to be necessary for the purpose, the quantity not to exceed what is required for the use of the ship until it next reaches its home port. The certificate given by the Medical Officer or Assistant Medical Officer of Health of the Port shall be marked by the supplier with the date of supply and shall be retained by him and kept available for inspection."

Hospitals.

16. Hospitals or other public institutions may be exempted from regulations, subject to the observance of conditions.—*See* p. 1011.

17. Drugs may be denatured in an approved manner.

Schedule I.

(*a*) Record of { Morphine, etc.
Diamorphine (Heroin), etc.
Cocaine, etc.
Medicinal Opium } Purchased or otherwise obtained.

Date on which supply received.	Name of person, body or firm from whom obtained.	Address of person, body or firm from whom obtained.	Amount obtained.	Form in which obtained.

(*b*) Record of { Morphine, etc.
Diamorphine (Heroin), etc.
Cocaine, etc.
Medicinal Opium } Sold or supplied.

Date on which the transaction was effected.	Name of person, body or firm to whom sold or supplied	Address of person, body or firm to whom sold or supplied.	Authority of person, body or firm to be in possession of the drug.	Amount sold or supplied.	Form in which sold or supplied.	When sale is on a prescription, specify the ingredients of the prescription.

Schedule II.—Exempted preparations.

Cereoli iodoformi et morphinæ, B.P.C.
Emp. opii, B.P., 1898.
Lin. opii, B.P.
Lin. opii. ammon., B.P.C.
Pasta arsenicalis, B.P.C.
Pil. hydrarg. c. opio, B.P.C.
Pil. ipecac. c. scilla, B.P.
Pil. plumbi c. opio, B.P.
Pil. digitalis et opii co., B.P.C.
Pil. hydrarg. c. cret. et opii, B.P.C.
Pulv. cretæ aromat c. opio, B.P.
Pulv. ipecac. co., B.P. (Dover's Powder).
Pulv. kino co., B.P.
Suppos. plumbi co., B.P.
Tablettæ plumbi c. opio, B.P.C.
Ung. gallæ c. opio, B.P. (gall and opium ointment).
Ung. gallæ co., B.P.C.

(*These preparations, nevertheless, come under the provisions regulating the sale of Poisons and the Pharmacy Laws.*)

xempted preparations.

We received the following direct statement from the Home Office:—
" Preparations can only be regarded as exempted from the Regulations if hey comply exactly with a formula specified in Schedule II. or differ only from he Schedule by the addition of some INERT substance or the substitution of ne INERT substance for another."

HOSPITALS,* &c.

By order of 15th August, 1921, the Home Secretary has exempted from he operation of the Regulations, any hospital or infirmary, asylum, poor w institution or sanatorium supported by any public authority or out of ublic funds or by a charity or by voluntary subscription in which the drugs re dispensed by a medical practitioner or a pharmacist or—in a poor law stitution—a dispenser whose qualifications and appointment are approved y the Minister of Health if the conditions of Schedule I. (below) are comlied with, or, if there is no such dispenser, if the conditions of Schedule II. elow) are complied with.

SCHEDULE I.

1. All orders for supplies must be signed by one of the medical practitioners ttached to the hospital or other institution, or, if the dispenser is a fully ualified pharmacist, by the dispenser.

2. All supplies to be received by, and kept in the charge of, the person sponsible for dispensing medicines, and records to be kept.

3. The medicine only to be dispensed for use of an individual patient, etc.

4 & 5. The person responsible for dispensing the drugs shall at the time dispensing any prescription stamp, or otherwise mark, the prescription nd shall keep records (to be kept 2 years).

6. Stock preparations of the drugs required to be kept in the wards or the out-patient department shall only be supplied by the dispensary on e written requisition of the sister in charge of the ward or out-patient deartment, and shall be kept by her under lock and key, and shall only be sed by her in accordance with the directions of one of the medical practioners in charge of the patients.

7. A requisition shall be marked in the dispensary to show that it has een complied with, and shall be filed in the dispensary, and a copy or note the requisition shall be kept by the sister in charge.

8. Precautions shall be taken to prevent any theft of the drugs.

9. Particular preparations of any of the drugs may be prescribed by refernce to any conventional name by which they are known in the hospital.

10. Nothing in this Schedule shall affect any Medicine or other substance which the Regulations do not apply.

SCHEDULE II.

Supplies are to be to, or on, the order of, a medical practitioner attached the hospital and he must certify that the supply is necessary for the treatent of the patients. The matron is to be responsible for keeping the drugs a locked cupboard) and for using or administering them and recording eir purchase, but they are only to be used, etc., under the direction of a edical practitioner attached to the hospital. Except so far as the Schedules pply, the Regulations must be observed—for instance the chemist supplying hospital must record the supplies, get them signed for and mark the packages on ordinary sales.

NURSING HOMES. The exemption does not apply.

SPECIAL AUTHORISATIONS. (H.O. Aug., 1921.).

Laudanum to Farmers and Stockowners.

P1 Laudanum for use solely in the treatment of animals may be sold to rmers and stockowners, *who produce on each occasion an authorisation from e chief officer of police* for the area in which they work. Purchaser must sign oisons Book. Not more than 32 fluid ounces may be supplied on each order.

Cocaine in Castor Oil to Factory Occupiers.

(Factory & Workshops Act, 1901.)

P1 A preparation for the treatment of injury to the eyes, consisting of not ore than 1 *part of Cocaine in 200 of Castor Oil*, with not less than 1 part

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****Dangerous Drugs (Hospital General Exemption Order) 924)*** relieves hospital pharmacists from adhering to restrictions of distribuon except where finished article is within the Act.—P.J. ii./24,312. C.D. pt. 13, 24, p. 398.

in 3,000 of Mercuric Chloride, may be sold to the occupier of a factory or workshop to which the Factory and Workshop Act, 1901, applies.

Authority to owners of ***British Steam Fishing Vessels*** to be in possession of this preparation of Cocaine was also granted under special conditions by the Home Office, Dec. 30, 1927.

Preparations of Opium to Midwives.

Preparations containing Opium (but not Morphine tablets) may be sold to certified and *practising* midwives for use in their profession or employment. They must sign the Poisons Book, and must be introduced if strangers.

S.R. & O., MARCH 28, 1922, NO. 298.

Concerning Marking Raw Opium for Export.

Packages for export otherwise than by parcel post, shall be marked on one side and on top with lettering at least two inches in height, with the words "RAW OPIUM, NET WEIGHT," and the number of pounds, the whole enclosed by a rectangular border at least one-half of an inch in width.

Packages sent by parcel post shall be marked in conspicuous and indelible block lettering with the words "RAW OPIUM, NET WEIGHT," and the number of pounds, the whole enclosed by a rectangular border.

The marking shall be on the package itself, and not on a label, ticket, or other thing attached thereto. No words, letters or figures, except those prescribed shall be placed within the rectangular border.

S.R. & O., OCT. 2, 1922, NO. 1086.

1. Regulation 3 of the Regulations of 20th May, 1921 (S.R. & O. 1921, No. 864) amended. We have made the addition.
2. The registers to be kept for two years from the date of the last entry.

S.R. & O. OCT. 2, 1922, NO. 1087.

Amending the Regulations made under Section 7 of the 1920 Act on the 20th May, 1921 (S.R. & O., 1921, No. 865):—

1. "The prescription shall not be given for the use of the prescriber himself." was to be added; subsequently ***revoked*** (S.R. & O., May 16, 1923, No. 577).
2. To add to Regulation 7 of the Principal Regulations "or attempt to obtain possession of." We have made the addition.
3. Prescriptions, records, registers or documents to be preserved for not less than two years.

DANGEROUS DRUGS AND POISONS (AMENDMENT) ACT, 1923. (17*th May*, 1923.)

(13 & 14 Geo. 5.)

An Act amending the Dangerous Drugs Act, 1920, *and Section seventeen of the Pharmacy Act,* 1868, *and to prescribe the method of calculating percentages in liquid preparations for the purpose of the Poisons and Pharmacy Act,* 1908, *and the Dangerous Drugs Act,* 1920.

1.—(1) This sub-section to be inserted in section 10 of the Dangerous Drugs Act, 1920, after sub section (1), concerns searching of premises under Authority of Justice of the Peace.

(2) Amendments in this sub-section of Section 10 of the 1920 Act have been made in our pages.

2. This section, in several sub-sections, is to be substituted in the 1920 Act bringing in a wider scope of definition of a person guilty of offence, *e.g.* with regard to false declarations, also as to *aiding* and *abetting* in any place even *outside* Great Britain in an offence punishable under any corresponding law in force in that place. *The salient points of sub-sections* 2 *and* 3 *of this section we have incorporated in the* 1920 *Act.*

Amendment as to dealing with Medical Men in P1 POISONS IN GENERAL.

3.—(1) So much of section 17 of the Pharmacy Act, 1868, as requires an entry in the Poisons book signed by the purchaser, shall not, subject to

e following conditions, apply where the purchaser is a medical practitioner, d the purchase is made by him for the purposes of his profession.

) (*a*) There must have been received by the seller before the sale a ***written order*** signed by the purchaser stating his name and address and the name and quantity of the article to be purchased.

(*b*) The seller must be ***reasonably satisfied*** that the signature is the signature of the person purporting to sign it, and that that person is a medical practitioner.

(*c*) The article sold, if sent by post to the purchaser, ***must*** be sent ***by registered post.***

(*d*) The seller must enter in the ***Poisons Book,*** in the column assigned to the signatures of purchasers, the words ***"signed order"*** with the ***date*** on which the order is ***executed*** and must preserve the order for two years from the date of the entry.

If a seller is reasonably satisfied that a ***medical practitioner*** siring to purchase the poison urgently requires it for his profession, but reason of some emergency is ***unable*** before delivery, either ***to furnish the seller*** an order in writing duly signed, or to attend and sign e Poisons Book, the seller may send the poison to the purchaser to ***be inded over*** to him either ***in exchange*** for such an order or on undertaking by the purchaser to furnish such an order within 24 hours. If the purchaser by whom the undertaking has been given fails to deliver igned order, or if any person for the purpose of obtaining delivery of the ison under the foregoing proviso makes a statement which is to his knowlge false, he shall be deemed to have procured the commission of an offence der the said Section 17.

(3) This section applies to dentists and veterinary surgeons as it applies medical practitioners.

4.—(1) Where any poison to which Section 17 of the Pharmacy Act, 1868, plies is supplied in accordance with a written N.H.I. PRESCRIPTION given a medical practitioner the seller shall not be required to make any entry in e book (Poisons Book) in accordance with the said section. (NOTE.—This es not exempt Dangerous Drugs in D.D. Register.)

(2) Section 17 of the Pharmacy Act 1868 shall have effect as if for the words "labelled with the name of the article and the word poison, and with the name and address of the seller of the poison," there were substituted the words "labelled with the name and address of the seller of the poison, with the word 'poison,' and with the name of the poison and in the case of a preparation which contains a poison as one of the ingredients thereof, with *such particulars as to the proportion which the poison contained in the preparation bears to the other ingredients as may be prescribed by Order in Council.*" The ***Labelling Order 1924*** s given *antea* p. 1002.

5.—For the purposes of the Schedule to the Poisons and Pharmacy Act, 08, and of section 8 of the Dangerous Drugs Act, 1920, ***percentages*** the case of liquid preparations shall, unless other provision in that behalf made by regulations under those Acts respectively, be calculated on the sis that a *preparation containing one per cent. of any substance means a paration in which one gramme of the substance, if a solid, or one millilitre the substance,* if a liquid, is contained in *every one hundred millilitres of the paration,* and so in proportion for any greater or less percentage.

.—(Sub-section 2) "Corresponding law" in the 1920 Act, as amended this Act, means any law stated in a certificate purporting to be issued or on behalf of the government of any country outside Great Britain be a law providing for the control and regulation in that country of the nufacture, sale, use, export and import of drugs in accordance with the visions of the *International Opium Convention* signed at the Hague 1/1912, and any statement in any such certificate as to the effect of the mentioned in the certificate, or any statement mentioned in any such certificate that any facts constitute an offence against that law, shall be conclusive. b-section 3). This Act shall not extend to Northern Ireland, except in matters which the Parliament of Northern Ireland have not power to make laws.

DANGEROUS DRUGS REGULATIONS 1926 (10 & 11 Geo. V., Chap. 46), *June* 4, 1926.

Amending D.D. Regulations 1921 (S.R. & O. 1921 No. 865) (*Cf.* P.J. i./26,603, ii./26,243).

The Regulations have been incorporated in the Principal Regulations No. 865 so far as is necessary. See p. 1006 *et seq.*)

DANGEROUS DRUGS ACT, 1925.

This Act, although it received the Royal Assent on 7th August, 1925, is ***not yet in operation*** and a conviction under it at the Old Bailey (Lieut.-Col. J. Kynaston) was quashed by the Court of Criminal Appeal (December, 1926). ***The Act will only come into operation upon an Order in Council*** being made for that purpose.

The chief effects of the Act, when brought into operation, will be :—

1. To add Coca leaves, Indian hemp and resins obtained from Indian hemp and all preparations of which such resins form the base to Part I. of the Act of 1920, *i.e.*, to put them into the same position as raw opium (see p. 1005 and p. 1006).
2. To extend the application of Part III. of the Act of 1920 and the Regulations made under it (see p. 1005 and p. 1007, &c.) by putting *synthetic cocaine, any extract or tincture of Indian hemp* and *any preparation, admixture, extract or other substance* containing *any proportion of diacetylmorphine* into the same position as morphine, cocaine, &c.
3. To amend the definition of medicinal opium (see p. 1005) so that it will read " raw opium which has undergone the processes necessary to adapt it for medicinal use in accordance with the *requirements of the B.P.* whether it is in the form of powder or is granulated or is in any other form and whether it is or is not mixed with neutral substances."
4. Make some technical administrative amendments in the Act of 1920.

MORPHINE ADDICTS.

Morphine addicts are defined as persons who, not requiring the continued use of a drug for relief of symptoms of organic disease, have acquired, as a result of repeated administration, an overpowering desire for its continuance and in whom withdrawal of the drug leads to definite symptoms of mental or physical distress or disorder. No obligation to keep record of morphine or other drugs if *prescribed* or *personally administered.*—From Departmental Committee Report on Morphine and Heroin Addiction 1926.—B.M.J. i./26,814.

Numerous suggestions as precautions in treatment of Addicts were made. There is danger with regard to ***' Chlorodyne,'*** see p. 567.

It was reported there is no present need, for the prevention of addiction, to lower the limit of morphine content now fixed (0·2%). The position as regards chlorodyne might be met if it could be secured in some way that no preparation should be sold under the name of ' Chlorodyne ' which contained more than 0·1 per cent. of morphine.

Historical Evolution of the Acts. In cases of infringement it was recommended that medical men should be dealt with by a specially constituted Tribunal instead of the Courts. At the Second Opium Conference (Feb. 1925) of the League of Nations recommendations that *all* preparations containing Heroin and the Cannabis preparations were to be placed under the D.D.A. were made. These are not yet legalised.—Sir W. Willcox, P.J. i./26,507.

The **Veronal group** commonly leads to addiction. They produce cerebral symptoms and an abnormal mental condition. Should only be supplied on medical prescription and the prescription should be retained, *i.e.*, Sects. 5 and 6 of the 1921 Regulations should apply.—Sir W. Willcox, P.J. i./26,508.

References to the Dangerous Drugs Regulations.

The passage of the Dangerous Drugs Act, 1920, endeavoured to give legis-
tive effect, so far as Great Britain was concerned to the obligations incurred
nder the International Opium Convention signed at the Hague 1912. An
dvisory Committee was appointed by the Council of the League of Nations.
eed to restrict production (of Opium, etc.). Smuggling widely prevalent.
-L. i./21,919; B.M.J. ii./21,329.

Analysis of 185,000 Insurance Prescriptions in Scotland, May,
922. Opium *per se* or in various forms of admixtures occurred 13,587 times
·3%); to tal quantity 11½ lbs. Cocaine in various forms 347 times (0·18%);
tal quantity 1043·57 grains. Morphine 10,690 times (5·7%). Demonstra-
ve proof of the comparatively small use of narcotic drugs in medicine, and
the rarity of preparations containing 0·2% Morphine or Diamorphine,
0·1% Cocaine.—P.J. ii./22,285.

A Plymouth chemist fined £100 for failing to register all Dangerous Drugs
ld by and supplied to him.—P.J. i./23,421.

COCAINE DENTAL ANÆSTHETICS. In view of the Dentists Act 1921, the
thority under the Dangerous Drugs Act, 1920, to certain *un*registered
ntal practitioners to purchase dental anæsthetics containing Cocaine, was
ithdrawn Nov. 30, 1922.

National Health Insurance Amendment, as to Raw Opium, also re *full*
rname (the latter subsequently withdrawn).—P.J. i./23,44,49.

The Amendment Bill presented by the Home Secretary February 15th,
923.—P.J. i./23,169.

The Earl of Onslow in moving the second reading of the Amendment Bill
the House of Lords (Apl. 25/23) pointed out that people who commit
rely technical offences were insured against the risk of heavy penalties.
ecause it was provided that no proceedings for an indictable offence should
instituted without consent of the Attorney-General or the Director of
blic Prosecutions.—B.M.J. i./23,779.

Dangerous Drugs Act, 1925.—Reviewed B.M.J. ii./25,354.

An account of the Internat. D. Drugs Convention.—P.J. i./25,226.

The obligations of Pharmacists under the D. D. A.—P.J. ii./25,626.

Possibility of the D.D. Regulations being in one publication.—P.J. ii./26,82.

The R.P.U. against D.D. Reg. ('lock and key,' etc.).—P.J. ii./26,13.

The penalties in regard to offences under the D.D. Acts are ridiculously
cessive. Dangerous Drugs should only be supplied on medical prescription
d should not be dispensed by a medical practitioner except in cases of
nergency.—Sir W. Willcox, P.J. i./26,544, D.D. Acts, 'their Application by
e Physician and the Pharmacist.' *Ibid.* 507,522. There are definite financial
crifices in respect of trading in which the pharmacist has had long-standing
ghts.—*See also* L. i./26,1071.

Kingsbury case. Appeal allowed with costs. He did not 'supply'—had
fact given the patient only sufficient doses of the drug to last until his next
sit. An important point concerning 'administration under direct personal
pervision,' etc.—B.M.J. ii./26,948.

A legally qualified medical practitioner must—under the Medical Act,
58—be registered. D.D. prosecution, B.M.J. i./27,819.

For a medical man to have to write the quantity of Morphine or Cocaine
contrary to the strict privacy of a medical prescription.—W. G. McNab,
xec. Meeting, N. British Branch Pharm. Socty., July, 1926.

British Trade in Dangerous Drugs—Report to League of Nations *re* Opium
d others for 1926—P.J. ii./27,208.

On June 4, '28, at Westminster, a summons against Mr. R. L. Dillon,
arged with obtaining Morphine simultaneously from two doctors without
sclosing to either that he was being treated by the other, was dismissed.
ere had been no concurrent treatment.—L. i./28, 1296.

POINTS OF ASSISTANCE.

In a memorandum issued from the Home Office (1st Edition, March, 1923,
printed B.M.J. i./23,69; 2nd Edition covering the 1923 Act, in addition,
ued July, 1923) it is stated that after consultation with the Minister of
ealth and the Scottish Board of Health it has been arranged for 'inspection'
relation to Medical Practitioners to be carried out in England and Wales

by *Medical Officers of the Ministry of Health,* and in Scotland by Medical Officers of the Scottish Board of Health.

Notes from the memorandum: A medical practitioner (but not a dentist) may dispense dangerous drugs for the use of his patient; he may also have raw Opium for use in compounding medicines, but raw Opium may not be supplied to a patient.

"Signed Orders" *in Wholesale Dealings re Part I. Poisons.* The intention of the alteration of Section 17 of the Pharmacy Act 1868, is to require signed orders from all persons except retail chemists.—C. D. June 16/23,843.

Wholesale dealing in Dangerous Drugs cannot be conducted without licences. A retail pharmacist can supply the drugs against 'signed orders,' but a pharmacist doing a wholesale and retail trade must apply for licences in respect of the wholesale side of his business. The licences run to about £13 p.a. with 2s. 6d. each for every licence for export.

Points liable to be forgotten in practice are:—

All the drugs covered by the Acts are $\boxed{\text{P1}}$ Poisons.

Dentists' and veterinary surgeons' (not doctors') prescriptions must have the amount of the drug stated on the label.

N.H.I. prescriptions need not have doctor's address; must *not* be repeated; must be kept as hitherto and sent to Pricing Bureau.

Typewritten prescriptions are accepted as 'written.'

The inclusion of the words "to attempt" to obtain the drugs is to deal with a person who tries to obtain through misrepresentation, even though the chemist discovers the fraud before parting with them.

Doctors may write prescriptions for themselves.

Telephone orders from medical practitioners may be executed, but the written order must follow within 24 hours.

Nursing Homes are not authorised persons.

Public Analysts and Teachers requiring the drugs must sign the Poisons Book.

Persons in charge of a laboratory must prove that the Institution to which it is attached has been approved by the Home Office for Dangerous Drugs Act purposes.—Mallinson.

A ***foreign*** medical practitioner, unless registered in England (see Register) is not a medical practitioner under the Act.

When in doubt—refuse to dispense, if the doctor is not known. The chemist is not legally bound to supply anything.

DANGEROUS DRUGS ACT
TABLES.

We have made the following calculations which should be of assistance to Medical Practitioners.

The following, and any quantities of drugs above the following, are within the meaning of the Act.

MIXTURES, INJECTIONS, NEBULÆ (SPRAY SOLUTIONS) and other liquid preparations.

'DRUG.'	PERCENTAGE LIMIT OF 'DRUG' ALLOWED IN A MIXTURE, ETC.	AMOUNT PER FLUID OUNCE.
Morphine (Anhydrous Base)	0·2	$\frac{7}{8}$ grain
,, Acetate.	0·28	$1\frac{9}{40}$,,
,, Hydrochloride.	0·26	$1\frac{11}{80}$,,
,, Tartrate.	0·27	$1\frac{29}{160}$,,
,, Sulphate.	0·27	$1\frac{29}{160}$,,
,, Hypophosphite.	0·25	$1\frac{3}{32}$,,
Liquor Morphinæ Acetatis. B.P.'14	28·0	135 minims
,, ,, Hydrochloridi. B.P.	26·0	125 ,,
,, ,, Tartratis. B.P.'14	27·0	130 ,,
Injectio Morphinæ Hypodermica (Tart.) B.P.'14	10·8	52 ,,
Cocaine (Base)	0·1	$\frac{7}{16}$ grain
,, Hydrochloride. B.P.'14 ..	0·112	$\frac{1}{2}$,,
,, Nitrate	0·12	$\frac{21}{40}$,,
Injectio Cocainæ Hypodermica. B.P.	2·24	10 minims
Extractum Cocæ Liquidum (0·5% alkaloids)	20·0	96 ,,
Diamorphine (*Base, i.e* Diamorphine under the Act)	0·1	$\frac{7}{16}$ grain
Diamorphine Hydrochloride (Heroin Hydrochloride)	0·115	$\frac{1}{2}$,,
Opium Medicinal. B.P.'14 (Raw Opium artificially dried containing 10% Anhydrous Morphine)	2·0	$8\frac{3}{4}$ grain
Extractum Opii Liquidum. B.P.'14 (0·75 Anhydrous Morphine)	26·6	128 minims
Extractum Opii Siccum. B.P.'14 .. (20% Anhydrous Morphine)	1·0	$4\frac{3}{8}$ grain
Liquor Opii Sedativus .. .. .. (1·5% Morphine)	13·3	64 minims
Tinctura Opii(1% Anhydrous Morphine)	20·0	96 ,,
Pulvis Opii Compositus. B.P.'14 .. (10% Opium)	20·0	$87\frac{1}{2}$ grains
Pulvis Cretæ Aromaticus cum Opio. B.P.14 ($2\frac{1}{2}$% Opium)	80·0 ***Exempted*** if not admixed with other active ingredients.	850 ,,
Pulvis Ipecacuanhæ Compositus (10% Opium)	20·0	$87\frac{1}{2}$,,
Pulvis Kino Compositus (5% Opium)	40·0	175 ,,

PILLS AND TABLETS.

'Drug.'	Limit Percentage Allowed.	
Pilula Ipecacuanhæ cum Scilla. B.P. [About 5% of Opium (0·5% Morphine)]	40·0 but *exempted* if not admixed with other active ingredient	Irrespective of weight and size of pill or tablet.
Pilula Ipecacuanhæ cum Urginea. B.P. [About 5% Opium]	40·0	
Pilula Plumbi cum Opio. B.P.'14 .. [About 12% Opium (1·2% Morphine)]	16·6 but exemption as above.	
Pilula Saponis Composita. B.P.'14 [About 20% Opium (2% Morphine)]	10·0 *not exempted*	

Limit Amount Allowed in One Grain.

Pilula Morphinæ Hydrochloridi	$\frac{1}{380}$	gr.	**Diamorphine (Base)** ..	$\frac{1}{1000}$	gr.
Pilula Morphinæ Sulphas	$\frac{1}{370}$	,,	**Diamorphine Hydrochloride** ..	$\frac{1}{870}$	,,
Pilula Morpinæ Tartratis ..	$\frac{1}{370}$	,,	**Opium**	$\frac{1}{50}$	,,
Cocaine Base	$\frac{1}{1000}$	,,	**Extractum Opii Siccum**	$\frac{1}{100}$	,,
Cocaine Hydrochloride	$\frac{1}{890}$	,,	**Pulvis Opii Compositus**	$\frac{1}{5}$	,,
Cocaine Nitrate.. ..	$\frac{1}{830}$	,,	**Pulvis Ipecacuanha Compositus** ..	$\frac{1}{5}$	,,
Extractum Cocæ (Solid) 2% alkaloids	$\frac{1}{20}$	,,	**Pulvis Kino Compositus**	$\frac{2}{5}$	,,

LOZENGES.

Generally made to weigh 20 grains.

'Drug.'	Limited Amount allowed in Lozenges.	
Morphine Hydrochloride	$\frac{1}{19}$ grain ..	[The B.P. Troch. Morphinæ ($\frac{1}{32}$ grain) are therefore outside the Act.]
Cocaine Hydrochloride	$\frac{1}{45}$,, ..	
Diamorphine (Base)	$\frac{1}{50}$,, ..	
Diamorphine Hydrochloride	$\frac{1}{44}$,, ..	
Opium	$\frac{2}{5}$,, ..	
Extractum Opii Siccum	$\frac{1}{5}$,, ..	
Trochiscus Krameriæ et Cocainæ—*cf.* **Cocaine Hydrochlor.** above.		

LINIMENTS AND LOTIONS.

'Drug.'	Limit Percentage Allowed.	Amount per Fluid Ounce.
Linimentum Opii. B.P.'14 (0·5% Morphine)	.. 40·0 (Exempted if not admixed with other active ingredients.)	192 minims
Tinctura Opii .. .. (in a liniment or lotion)	.. 20·0	96 ,,
Oleatum Morphinæ (1 in 60)	.. 12·0	58 ,,

SUPPOSITORIES, PESSARIES, OVULES AND TAMPONS.

‘ DRUG.’	LIMIT AMOUNT ALLOWED.
Morphine Hydrochloride. .	$\frac{13}{40}$grain in 125 grains, or $\frac{1}{25}$ gr. in 15 grains
Cocaine (Base)	¼ ,, ,, 250 ,, ,, $\frac{3}{200}$,, 15 ,,
Cocaine Hydrochloride . .	$\frac{7}{25}$,, ,, 250 ,, ,, $\frac{1}{60}$,, 15 ,,
Extractum Cocæ . . . . (2% alkaloids)	12½ ,, ,, 250 ,, ,, ¾ ,, 15 ,,
Diamorphine (Base) . .	¼ ,, ,, 250 ,, ,, $\frac{3}{200}$,, 15 ,,
Diamorphine Hydrochlor.	$\frac{2}{7}$,, ,, 250 ,, ,, $\frac{1}{60}$,, 15 ,,
Opium. B.P.’14	5 ,, ,, 250 ,, ,, $\frac{3}{10}$,, 15 ,,
Plumbi Composita. B.P.’14	The *Off*. Suppositories are *exempted*.
Extractum Opii. B.P.’14	2½ grains in 250 grains or $\frac{3}{20}$grain in 15 grains

BOUGIES.

2½ inches made with Oleum Theobromatis weigh 20 grains.
2½ ,, ,, ,, Bougie Mass weigh 25 grains.
4 ,, ,, ,, Oleum Theobromatis weigh 40 grains.
4 ,, ,, ,, Bougie Mass weigh 50 grains.

‘ DRUG.’	LIMIT AMOUNT.
Morphine Hydrochloride. .	$\frac{1}{19}$ grain in 20 grains ($\frac{1}{15}$ in 25, $\frac{2}{19}$ in 40, $\frac{2}{15}$ in 50 grains).
Cocaine Hydrochloride . .	$\frac{1}{45}$,, ,, 20 ,, ($\frac{1}{36}$ in 25, $\frac{2}{45}$ in 40, $\frac{1}{18}$ in 50 grains).
Opium. B.P.’14	$\frac{2}{5}$,, ,, 20 ,, (½ in 25, $\frac{4}{5}$ in 40, 1 in 50 grains).

OINTMENTS, PASTES, ETC.

‘ DRUG.’	LIMIT PERCENTAGE ALLOWED.	AMOUNT PER OUNCE (AVOIR).
Morphine (Anhydrous Base)	0·2	⅞ grain
Morphine Hydrochloride	0·26	1$\frac{11}{80}$,,
Cocaine (Base)	0·1	$\frac{7}{16}$,,
Cocaine Hydrochloride	0·112	½ ,,
Unguentum Gallæ cum Opio. B.P.’14	Exempted.	
Opium	2·0	8¾ ,,
Extractum Opii Siccum	1·0	4⅜ ,,

EXAMPLES OF DD PRESCRIPTIONS.

Note: According to the 1926 *D.D. Regulations if B.P. or B.P.C. or N.H.I.* prepns. are used solely in a prescription it suffices to state the amount of the 'Dangerous' *preparation.* Otherwise calculation must be made as in the instance of Trochisci Menthol et Heroin, p. 1021.

The name and address of patient and the **date** *and the medical practitioner's usual signature and* **his address must** *appear on every prescription.*

℞

Morphine	$\frac{1}{30}$ grain
Sodium Bicarbonate	8 grains
Magnesium Carbonate	7 grains

Fiat pulv. 1, *mitte tales* 60. *Sig.* 1 *t.d.s.*
Total amount of Morphine, 2 grains.

To be repeated on July 21st, 1928, *and on August 11th,* 1928, *only.*

R. Mason M.D.,
317, Harley Street, London, W.1.

The qualifications need not actually be stated.

℞

Liquid Extract of Opium	2 ounces
Extract of Belladonna	½ ounce
Glycerin to	6 ounces

Sig. To be applied on lint 2 or 3 times a day.
Total amount of Liquid Extract of Opium 2 ounces.

℞

Ext. Cocæ Liq.	1 drachm
Syl Vanillæ	1 drachm
Elix. Saccharin	5 minims
Aq. ad	½ ounce

Send 16 ounces. *Sig. Coch. mag. p.r.n.*
Total Coca Alkaloids, 8¾ grains.

To be repeated on July 21st, 1928, *and August 11th,* 1928, *only.*

℞

Cocaine Hydrochloride	½%
Menthol	2½%
White Soft Paraffin	*q.s.*

Send 4 drachms. *Sig.* The ointment for the nose.
Total Cocaine Hydrochloride, 1⅕ grains.

℞

Morphine Hydrochloride	½ grain
Theobroma Oil to	15 grains

M. ft. Suppos. 1; *mitte* 36.
Total Morphine Hydrochloride, 18 grains.

℞

Pulv. Cretæ Aromat. c. Opio	10 grains
Ext. Nucis Vom.	⅛ grain

Misce et fiat Slipule i. Mitte XII.
Sig. i. to be taken thrice daily between meals.
Total amount of Pulv. Cretæ. Aromat. c. Opio. 120 grains.

℞

Injectio Morphinæ Hypodermica, B.P. 10 Cc.
Fiant ampullæ XX. Sig. i. s.o.s.
Total amount of Inj. Morph. Hyp. 10 Cc.

℞

Pulv. Opii	3·75 Gm.
Pulv Gallæ	12·5 Gm.
Ung. Hamamelidis ad	50·0 Gm.

Fiat unguentum. Sig. m.d.a.
Total Opium Content, 3·75 Gm.

℞

Cocaine Hydrochloride	$\frac{1}{10}$ grain
Morphine Hydrochloride	⅕ grain

Fiat aurinarium; *mitte* 20. *Sig.* One to be inserted when the pain is severe.
Total Cocaine Hydrochloride, 2 grains. Total Morphine Hydrochloride 4 grains.

℞

Cocaine Hydrochloride .. $\frac{1}{2}$ grain.
Theobroma Oil .. .. .. *q.s.*
Fiat bougie i.—4 ins. in length; *mitte XII.* *Sig.* To be used as directed;
Total Cocaine Hydrochloride, 6 grains.

℞

Resorcin .. .. 40 grains
Solution of Cocaine Hydrochloride, $\frac{1}{2}$% to 4 ounces
Sig. To be used in nasal spray 3 or 4 times a day.
Total Cocaine Hydrochloride, 8$\frac{3}{4}$ grains.

℞

Morphine Bimeconate .. .. $\frac{1}{8}$ grain
Butyl Chloral Hydrate.. .. 3 grains.
Gelseminine Hydrochloride .. $\frac{1}{200}$ grain
Fiat pilula, mitte 8. *Sig.* 1 every half hour until 4 pills are taken and then ery hour for 4 hours.
Total Morphine Bimeconate, 1 grain.

℞

Trochisci Menthol c. Heroin, $\frac{1}{12}$th grain, 1 ounce.
Sig. Take one for cough.
Total Heroin Hydrochloride, 1$\frac{5}{6}$ grains.

℞

Cocaine Hydrochloride .. $\frac{1}{2}$ grain
Adrenalin.. .. .. .. $\frac{1}{500}$ grain
Glycogelatin basis .. .. *q.s.*
Fiat ovule i. Mitte XII *Sig. m.d.u.*
Total Cocaine Hydrochloride, ... 6 grains.

℞

Tinct. Opii .. .. ..
Acid Sulph. Aromat. .. .. *aa* 2 drachms.
M. ft. guttæ. *Sig.* *Guttæ viginti ex aqua quotidie sumendæ.*
Total amount of Tinct. Opii. 2 drachms.

EXAMPLE OF DENTIST'S PRESCRIPTION.

Name and address of the patient.

℞

Cocaine Hydrochloride .. 10 grains
Adrenalin Solution .. .. 10 minims
Distilled Water to .. .. $\frac{1}{2}$ ounce
Total Cocaine Hydrochloride, 10 grains.
(Dispenser must state this on label.)
Apply with a pledget of wool to the part occasionally
FOR LOCAL DENTAL TREATMENT ONLY.
To be repeated at intervals specified.
(Usual signature, date and address.)

EXAMPLE OF VETERINARY SURGEON'S PRESCRIPTION.

Name and address of
Owner of dog.

℞

Opium in powder .. .. 20 grains
Sulphur Ointment to .. .. 1 ounce
Total Opium content, 20 grains.
(Dispenser must state this on label.)
For the dog.
FOR ANIMAL TREATMENT ONLY.
(Usual signature, date and address)

EXAMPLE OF 'SIGNED ORDER.'

By Medical Man complying with 1923 Act
for ***postal transmission of*** $\boxed{P1}$ ***Poisons in general***
(whether Dangerous Drugs or not).

Please send me (by *Registered* Post):—
Opium Medicinal in powder, 4 ounces.
Ext. Cocæ Liq., 1 lb.
Morphine Hypophosphite, 1 ounce.
Diamorphine Tablets, $\frac{1}{10}$ grain, 100.
Liq. Strych. HCl., 4 ounces.
Ext. Nucis Vom. Liq., $\frac{1}{2}$ lb.
(*Usual signature and address*).

SIMILAR SIGNED ORDERS SHOULD BE GIVEN BY A DENTIST OR VETERINARY SURGEON.

Caution.—The requirements of the Act are ***in addition*** to the provisions of Sect. 17 Phcy. Act 1868. The purchaser must ***be known to the seller*** or be ***introduced.*** Failing this, the pharmacist should refuse to supply.

VENEREAL DISEASE ACT, 1917.

An Act to prevent the treatment of Venereal Disease (syphilis, gonorrhœa or soft chancre) otherwise than by ***duly qualified medical Practitioners,*** and to control the supply of Remedies therefor. The following is a résumé:—

1.—(1) In any area in which this section is in operation, a person shall not, ***unless he is a duly qualified medical practitioner,*** for reward either direct or indirect, ***treat any person for venereal disease*** or prescribe any remedy therefor, or give any advice in connection with the treatment thereof whether the advice is given to the person to be treated or to any other person.

(2) This section shall operate in any area to which it is applied by order of the Local Government Board, or, in Scotland and Ireland, the Local Government Board for Scotland and Ireland respectively:

Provided that no order shall be made in respect of any area until a scheme for the gratuitous treatment of persons in that area suffering from venereal disease has been approved by the Local Government Board, or, in Scotland and Ireland, the Local Government Board for Scotland and Ireland respectively, and is already in operation.

2.—(1) A person shall ***not*** by any advertisement ***treat or offer to treat any person for venereal disease,*** or prescribe or offer to prescribe any remedy therefor, or offer to give or give any advice in connection with the treatment thereof.

(2) On and after the first day of November, 1917, a person shall not recommend to the public by any notice or advertisement, or by any label or words written or printed, affixed to or delivered with, any packet, box, bottle, phial, or other inclosure containing the same, any pills, capsules, powders, lozenges, tinctures, potions, cordials, electuaries, plaisters, unguents, salves, ointments, drops, lotions, oils, spirits, medicated herbs and waters, chemical and officinal preparations whatsoever, to be used or applied externally or internally as medicines for the prevention, cure, or relief of any venereal disease:

Provided that nothing in this section shall apply to any advertisement made by any local or public authority or made with the sanction of the Local Government Board, or in Scotland and Ireland the Local Government Board for Scotland and Ireland respectively, or to any publication sent only to duly qualified medical practitioners or to wholesale or retail chemists for the purposes of their business.

3.—Penalties: Imprisonment, with or without hard labour, for not exceeding two years, or on summary conviction to a fine not exceeding one hundred pounds, or to imprisonment, with or without hard labour, for a term not exceeding six months.

National Council for Combating Venereal Disease. Meeting at Edinburgh Resolutions—L. i./19,352.

DENTISTS ACT, 1921.

Came into force November 30th, 1922. ***Expressly restricts ractice of dentistry to registered dental practitioners.*** nder the Act about 8,000 hitherto unregistered dental practitioners were lded to the Dentists Register.

No person can now enter the dental profession without going through the ental curriculum and obtaining a diploma or degree. Exceptions are in e cases of registered medical practitioners, registered pharmacists and minor ental work in a public service under conditions approved by the Ministry Health.

Regulations adopted by the newly constituted Dental Board (obtainable om the office of the Board), 44, Hallam Street, W., post free 2s. 8d.), deal *ter alia* with the keeping of the Register. Persons registered under the new ct include those in practice for 5 of the 7 years prior to July 28, 1921; members the Incorporated Dental Society and pharmacists who applied for registraon showing that immediately prior to that date they had a substantial practice dentistry.—Refs.: B.M.J. Supp. i./22,19; B M.J. ii./22,283,894,1099,1113, 99; P.J. ii./22,527.

THERAPEUTIC SUBSTANCES ACT, 1925.

(15 *&* 16 *Geo.* 5., *Ch.* 60.)

An Act to provide for the regulation of the manufacture, sale, and importation of vaccines, sera, and other therapeutic substances. (*7th August*, 1925.)

1. This Act applies to:

(1) ***Vaccines, sera, toxins, antitoxins and antigens.***
(2) ***Salvarsan*** (Dioxy-diamino-arseno-benzol-di-hydrochloride) and analogous substances used for the specific treatment of infective diseases.
(3) Preparations of the specific antidiabetic principle of the pancreas known as ***insulin.***
(4) Preparations of the ***posterior lobe of the pituitary body*** intended for use by injection.

and any other therapeutic substances, afterwards called 'substance,' which may from time to time be added, as being substances the purity or potency of which cannot be adequately tested by chemical means.

2.—(1) To manufacture for sale any substance to which this Act applies a licence from the licensing authority is required.
(2) The licence continues in force for such period as may be prescribed (2 years), but may from time to time be renewed for a like period.
(3) The conditions under which the substances are manufactured, and the premises, must satisfy the licensing authority.
(4) A licence may be revoked or suspended if the licensee fails to comply with the requirements.
(5) This section does not apply to the preparation by a medical practitioner for any of his own patients or for and at the request of another practitioner, if specially prepared with reference to the condition, and for the use, of an individual patient.

.—(1) Importation into Great Britain or Northern Ireland necessitates standards of strength, quality and purity, and the substance is to be consigned to a person licensed by the licensing authority to import: or to a person engaged in scientific research holding a special licence to import.
(3) Substances prohibited come under Section 42 of the Customs Consolidation Act, 1876, and any Act amending or extending.

.—(1) Joint Advisory Committees frame regulations.

.—(1) The joint committee has power to make regulations for prescribing standards, tests, adding to the Schedule, prescribing the forms of licences, including inspection of premises and plant, and to take samples, and to exclude any substance used solely for veterinary purposes. If advertised or sold as a proprietary medicine or contained in such medicine, such accepted scientific name, or name descriptive of the true nature and origin of the substance, as may be prescribed shall appear on the label. Date of manufacture shall be stated on all vessels or packages, and the sale is prohibited after the expiry of the prescribed period.

6.—Contravention of the Act renders a person liable on summary conviction to a fine not exceeding £100, and on second or subsequent convictions to fine and imprisonment with or without hard labour for not exceeding 3 months, and in either case goods to be forfeited and licence may be revoked or suspended.

7.—(1) The licensing authorities are for England and Wales, The Minister of Health: for Scotland, the Scottish Board of Health: for Northern Ireland, the Minister of Home Affairs for Northern Ireland.

THE THERAPEUTIC SUBSTANCES REGULATIONS 1927, No. 486.

PART I. *Interpretation, etc.*

1.—(2) The provisions relating to labelling, other than those in Part VIII. (Veterinary), came into operation on February 6, 1928, but otherwise these Regulations came into operation on August 6, 1927.

PART II. *Licences for Manufacture of Therapeutic Substances.*

6.—(1) (*a*) Concerns provision of adequate staff and premises for manufacture.

(*b*) And for tests of the strength, quality and purity of the substance including housing for animals used, or the licensee shall make arrangements with some institution approved for such tests to be regularly carried out on his behalf.

(*c*) Records of manufacture and tests to be kept with batch-number.

(*d*) Inspectors may inspect the premises and plant and the process of manufacture and the means employed for standardising and testing and may take samples.

(*e*) Any changes in the expert staff responsible and in the premises or plant to be reported.

(*f*) Samples to be furnished on request.

(2) The licence may be revoked or temporarily suspended.

PART III. *Provisions with regard to names of substances and to containers, etc.*

7.—If any substance is advertised or sold as a proprietary medicine or is contained in a medicine the 'proper name' of the substance shall appear on the label in the manner prescribed in this Part of these Regulations.

8.—The substance is to be sealed in a previously sterilised glass container, except when effectively sterilised by heat after being filled in the containers, and except in the case of particular preparations when additional requirements may be necessary.

9.—(1) *Labelling.* The following are required:—

(*a*) The proper name of the substance in letters not less conspicuous than those in which the proprietary name, if any, is written or printed, and following immediately after or under such proprietary name.

(*b*) The name and address of the manufacture.

(*c*) The number of the licence under which the substance is manufactured.

(*d*) A distinctive batch number.

(*e*) Date of manufacture.

(*f*) Where a test for minimum potency is required by these Regulations, a statement of potency.

(*g*) Where a test for maximum toxicity is required, a statement that the substance has passed such test for toxicity.

(*h*) Dates for reaching minimum potency or maximum toxicity to be stated.

(*i*) Where an antiseptic substance has been added, the nature and the percentage proportion introduced.

(*j*) The precautions necessary as regards (*h*) of this paragraph.

(2) Defines the date of manufacture, or removal from cold storage at a temperature not exceeding 5° C.

—The sale of a substance after prescribed date is prohibited, but a practitioner may override this if his attention has been drawn to the date and he is satisfied it is required by the urgency of the case.

RT IV. *Standards of strength, quality and purity, and tests for etermining.*

—Tests for living aerobic or anaerobic bacteria are to be made in the case of :—

- (*a*) Sera and solutions of serum proteins for injection.
- (*b*) Certain bacterial vaccines.
- (*c*) Toxins, antigens, and mixtures of toxins or antigens with serum.
- (*d*) Solutions of insulin.
- (*e*) Dry preparations of insulin intended for therapeutic use.
- (*f*) Preparations of the posterior lobe of the pituitary body.

—The tests are to be applied :—

(1) To samples taken from each batch of the substance before filling and sealing the containers : and

(2) to the contents of sample containers when ready for issue.

—(1) In the case of samples taken from the batch at the time when the test is made, the quantity taken for test shall be not less than 0·1% of the total volume of the batch if the volume is not more than 10 litres, and not less than 10 Cc. if the volume is 10 litres or more, but shall in no case be less than 1 Cc. if the batch is contained in a number of bulk containers, samples in these proportions shall be taken from each of such bulk containers and separately tested.

(2) In the case of the contents of sample containers, the number shall be not less than 1% of the total filled from the batch, if this number is not more than 1,000, and not less than 10 if the total number is more than 1,000.

—(1) Defines method of use of media.

—(1) In the case of samples taken from the batch one-half of the total volume of the sample is to be used for aerobic and one-half for the anaerobic test.

(2) In the case of the contents of sample containers, the contents of each container shall be tested for aerobic and anaerobic organisms. When the volume in each container is 2 Cc. or more the contents shall be divided into two approximately equal parts, one for the aerobic and the other for the anærobic test.

(3) The inoculated tubes shall be incubated at 37° C. for *seven days* and examined after incubation, permanent records being kept of such examination of each tube.

—(1) If at this examination no growth is visible in any tube, the sample has passed the test.

(2) If at the examination a growth is visible, further samples may be taken and the tests repeated. The taking of samples from the batch may, if necessary, be repeated twice, if the same organism is visible in more than one test, the batch shall be treated as not sterile and the material contained in the batch shall not be issued or used as part of a further batch unless and until it has been resterilised and has passed the tests.

—Emergency Regulations.

—Freedom from abnormal toxicity is ensured by injecting 0·5 Cc. of the serum into a normal mouse.

RT V. Deals with *Substances for Export only.* The licensing uthority may dispense with any of the requirements of the Regulations, if ecessary.

RT VI. *Licences for Import of Substances.*

and **23.**—Broadly, the applicant must furnish a written undertaking signed by, or on behalf of, the manufacturer that the manufacturer will comply with the Regulations as to manufacture and testing

RT VII. *Research Licences.* Special modifications apply.

RT VIII. *Substances for Veterinary Use only.*

.—Containers to be marked 'to be used solely for veterinary purposes.'

THE FIRST SCHEDULE provides forms of application for licences.

THE SECOND SCHEDULE. PART I. Vaccines, toxins, antigens, sera and antitoxins.

(A) Provisions applicable to the production of Bacterial Vaccines.

(2) Defines a bacterial vaccine.

(3) The proper name of a vaccine is the name of the micro-organism followed by the word 'vaccine,' except in the following:

Anti-typhoid vaccine
Anti-typhoid-paratyphoid vaccine (T.A.B.)
Anti-typhoid-paratyphoid-cholera vaccine (T.A.B.C.)
Anti-plague vaccine
Anti-dysentery vaccine
Whooping cough vaccine.
Tubercle vaccine

(6) The label on the container must indicate the composition by reference:—

(*a*) To the number of micro-organisms per Cc. or
(*b*) To the weight of dried substance of micro-organisms per Cc. or
(*c*) To the number of micro-organisms or weight of dried substance of organisms used in preparing 1 Cc. of the finished product.

(B) Special provisions applicable to the production of **Vaccine Lymph** (Vaccinia).

(1) The proper name is '**Vaccine Lymph.**'

PART II. Toxins and antigens.

(A) Provisions applicable to reagents used in the **Schick Test** for the diagnosis of susceptibility to diphtheria.

1.—(1) The reagents used in the Schick Test are two, Schick Toxin and Schick Control. Their proper names respectively are 'Schick Test Toxin' and 'Schick Control.'

(2) Schick Toxin is a sterile filtrate from a culture on nutrient broth of the specific organism of diphtheria (*Corynebacterium diphtheriæ*). It may be issued either (i) undiluted, or (ii) already diluted with saline solution to the strength proper for use in the test.

2.—(1) Schick Control is prepared from the same batch of Schick Toxin as that with which it is issued for sale, by destroying the specific toxicity at 70° C. for a time not shorter than 5 minutes.

(B) Provisions *re* **Diphtheria Prophylactic.**

(C) Provisions *re* **Tuberculins** and other preparations from the Bacillus tuberculosis and its cultures.

PART III. Provisions *re* production of all sera from living animals.

PART IV. Provisions *re* particular sera and antitoxins.

(A) **Antimeningococcus serum.**
(B) **Anti-dysentery serum** (Shiga) and other anti-dysentery sera.
(C) **Diphtheria antitoxin** (proper name).
(D) **Tetanus antitoxin** (proper name).

THE THIRD SCHEDULE. Arsenobenzene (commonly known as **Salvarsan**) and its derivatives.

PART I. Re Arsenobenzene and its derivatives.

(1) The standard preparations are kept in the National Institute for Medical Research, Hampstead.
(2) Biological tests are applied.
(3) (i) Test for maximum toxicity, and (ii) test for therapeutic potency.

PART II. Special provisions *re* Arsenobenzene. Chemical and physical data.

PART III. Special provisions *re* Novarsenobenzene. Chemical and physical data.

PARTS IV. and V. Special provisions *re* Sulpharsenobenzene. Chemical and physical description.

THE FOURTH SCHEDULE. Insulin:—Proper name. Special conditions of licence. Standard preparation. Unit of standardisation. Quality. Tests. Container. Label.

THE FIFTH SCHEDULE. Pituitary (Posterior Lobe) Extract:—Proper name. Standard Preparation. Unit of standardisation. Quality. Tests and Label. Refs. B.M.J. Supp. ii./25,105; P.J. ii./25,286.

TRADE MARKS.

The 1905 Trade Marks Act defined a Trade Mark as follows :—

A trade-mark shall mean a mark used, or proposed to be used, upon n connection with, goods for the purpose of indicating that they are the ds of the proprietor of such trade-mark by virtue of manufacture, selec- , certification, dealing with, or offering for sale."

t is important to realise that Trade Marks can exist as Common **Trade Marks.** An unregistered trade mark can be protected by passing off" action, *i.e.* for an injunction and damages.

A trade mark, which may be registered in 50 Classes, must con- n or consist of at least one of the following essential particulars:—

1) The name of a company, individual, or firm represented in a special particular manner.

2) The signature of the applicant for registration or some predecessor his business.

3) An invented word or invented words.

4) A word or words having no direct reference to the character or quality he goods, and not being according to its ordinary signification a geographical ne or a surname.

5) Any other distinctive mark. But a name, signature, or word or words, er than such as fall within the descriptions in the above paragraphs (1), (3), and (4), shall not, except by order of the Board of Trade or the Court, deemed a distinctive mark.

rade Marks may be registered in fifty classes, and the legal protection of Trade Mark is restricted **to the class in which it is registered.**

he ***Classes of goods*** with which the pharmacist is mostly con- ned are the following. (We give them in order of frequency) :—

II. Chemical substances prepared for use in medicine.

1. Chemical substances used for agricultural, horticultural, erinary and sanitary purposes.

XLII. Substances used **as food** or as **ingredients in food.**

. Chemical substances used in **manufactures, photography,** or losophical research and anticorrosives.

XLVIII. **Perfumery** (including toilet articles, preparations for the teeth hair and perfumed soap).

Ve indicate Trade Marks by the ✱ preceding the name of the article and e added *the numbers* thus : T.M. 326021 to each, so far as our searches at Patent Office have indicated. Having to consult these numerous classes, ssions may have occurred. As the Patent Office Public Index is con- ually under revision it is possible that alterations may have been made sequently. We shall therefore welcome information as to corrections for sideration in a future edition.

he utility of the numbers is this—that it enables any person by the pay- nt of a small fee at the Patent Office to obtain information as to the status the Trade Mark in question—date of registration, date of payment of ewal fees, details of assignment and so on. This information could not sonably be incorporated in our pages.

he late S. W. Woolley, Editor of the "Chemist and Druggist" (London), excellent service in showing up the anomalous condition of the law in ard to Trade Marks—particularly in respect of

TRADE MARKS FOR PATENTED ARTICLES.

When an article has been introduced as new and has been first manufactured under a patent, the name by which it is known becomes common property as oon as the expiration of the patent rights put an end to the monopoly in the manufacture and sale of the article, and although the name may, down to that ime, have identified the goods with the maker of them, it is no longer available or him as a Trade Mark or Trade Name.

"It is impossible to allow a man to prolong his monopoly by trying to turn a description of the article into a Trade Mark. Whatever is mere description is open to all the world."—*Lord Justice James, in Cheavin* v. *Walker* (1877).

When it is understood that a Trade Mark, by renewal every fourteen years, can be continued indefinitely, and that renewals of the Trade Marks applied to patented articles are made after the expiry of the patent, the extent of the continuance of the monopoly will be realised.

The Patents, Designs and Trade Marks (Temporary Rules) Act 1914 and the Rules made under it with which we dealt very fully in our 17th Edn., p. 956 *et seq.* were "to continue in force during the continuance of the present state of war in Europe and for a period of 6 months thereafter."

It may be recalled as an important point that certain Trade Marks, *e.g.* Aspirin, Lysol, Metol, Urotropin were ***avoided*** (meaning legally invalidated or made of no effect). These words are ***public property*** and the rights which the registration originally gave to the owners have come to an end.

Certain words were on the other hand, temporarily ***'suspended,' e.g.*** Salvarsan, Neo-Salvarsan and Novocain.

The Patents and Designs Act, 1919, strengthens the provisions for the protection of British Industry in the Act of 1907. The 1919 Act is concerned 'for the prevention of abuse of monopoly rights'; if within four years from the date of a patent, the invention is not worked within the United Kingdom on a commercial scale, or if the demand for the patented article in the United Kingdom is not adequately met, and for other reasons, the Comptroller may grant '*licences of right*' (exclusive or non-exclusive) to any applicant on such terms as he (the Comptroller) may decide or may even revoke the patent.

Section 11 enacts that the specification for an 'invention relating to substances prepared or produced by chemical process or intended for food or medicine' ***shall not include a claim for the substance itself,*** except when prepared or produced by the special method or process of manufacture described and claimed (in the specification) or by its previous chemical equivalent. Any applicant is *prima facie* entitled to a licence for a food or medicine *patent*. Registration of assignments, etc., of patents is made compulsory. The term of a patent is to be ***sixteen years*** instead of fourteen, and existing patents and licences are extended for two years accordingly.

The Trade Marks Act, 1919, in force since April 1st, 1920, divides the register of trade marks into two parts; ***part A*** is to consist of those marks already registered and those hereafter registered under the previous Acts (which, with some amendments, remain in force), ***part B*** is to contain a new class of marks, for ***any mark which has been in use for two years*** may be registered, under the new Act, unless deceptive or closely resembling a mark already registered. This is apparently intended to permit the registration of many marks which could not be registered under the previous Acts. Registration in part B will, however, only be *prima facie* evidence of ownership: it will never become conclusive, whereas registration in part A is generally conclusive after 7 years. An important new provision is Section 6:—***'Where in the case of an article or substance manufactured under any patent............a word trade mark ....is the name*** or only practicable name of the article or substance so manufactured, ***all right to the exclusive use of such trade mark,............shall cease upon the expiration or determination of the patent,'*** &c. There is also a provision against registration of a word 'which is the only practicable name or description of any single word chemical element or single chemical compound as distinguished from a mixture.' These two provisions are intended to prevent the abuse of trade mark law.

CONFERENCE ON EMPIRE PATENTS, June 1922, in London. To institute a system of granting patents, which should be valid throughout the British Empire. Need of having an agreement on the definition of the word 'inventor' and the rights of importers to obtain a patent. There is a divergence of practice between the United Kingdom and some of the Dominions. A Commission of legal, technical and business men, and Government officials, necessary. There is a semi-chaotic state of things.—C.D., Aug. 26, 1922.

THERAPEUTIC INDEX
OF
DISEASES AND SYMPTOMS.

Internal Remedies and Chemicals Injected are in Roman type.
ccines as a general rule are for hypodermic use.
Remedies for local or external use are in italics in a separate
ragraph. Great care should be taken as the Index is merely
ended to refer the reader to the text.

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bortion, Threatened.—Hydrastis, Quinine, Sumbul, Viburnum pruni-
um.

bscesses, general, to abort.—Aconite, Belladonna, Calcium Sulphide,
. in Stearettes), Mang. Butyrate, Quinidine Preps., Quinine, Staphylococcal
cine.
ocally.—Acid Carbolic, Argenti Nitras, B.I.P.P., Colloidal Iodine, Dakin's
ution, Eusol, Hydrogen Peroxide, Tincture of Iodine, Unguentum Bella-
nnæ, Ung. Iodi Intinctum. See also **Wounds.**

bscesses, Dental. *Locally.—Boric Acid Lotion, Copper and Zinc Ionisa-*
, Dental Solubes, Formosyl, Borated Hydrogen Peroxide, Iodates.

bscess Liver, Tropical.—Antimonials, Arsenicals, Auremetine, Emetine
ections, 'E.P.I.,' Ipecacuanha, Vaccine of Organism if isolated, Quinine
ections.

cidity of Stomach.—Alkalis, Ammonia preps., Aperfine, Belladonna,
muth preps., Bismuth and Pancreatin, Bisciniod, Calcii Carbonas, Carbo
ni, Cremor Magnesiæ, Magnesii Carb. or Oxide, Oleum 'Elliott' Caps.,
ass. Bicarb., Sodii Bicarb.
n ounce of Almond Oil (internally), *q.v.*, first thing in the morning, repeated
ore other meals if necessary. See also Hyperchlorhydria.

cidosis—Administer purgative, wash out stomach, then subcutaneous,
better, intravenous injection of Sodium Bicarbonate Solution. Sodium
tate or Sodium Citrate *per os*—Glucose Rectal Injection.
cidosis in diabetes, starvation, various poisonings, cyclic and periodic
iting, etc.—Alkalis, Alcohol. See also **Diabetes.**
aboratory observations on acidosis.—G. Matthew Fyfe, B.M.J. i./27,800.

cne—Acid Camphoric, Arsenic, Brominol, Calc. Sulphid. Stearettes,
xin, Fæxin Extract, Guaiacol, Hypophosphites, Liquor Auri et Arsenii
midi, Liquor Auri et Hydrarg. Bromidi, Ol. Morrhuæ, Phosphorus, Potassii
mid., Quininæ et Ferri Citras, Sodii Bromid., Stannoxyl, Sulphur (and
oid), Sulphur Stearettes. Turpentine in Oil Injection, Vaccines.
ocally.—Acid Carbolic, Acid Lactic, Acid Nitric, stabs, Anserin Mulls,
ictd., Calaminæ Lotio, Hydrarg. Perchlorid. Lotio, Ichthyol, Ichthyol-
rcin and Salicylate, Iodates, Isopropyl Alc., Lotio Sulphuris cum Saponel,
laia Lotion, Ung. Resorcin Co., Colloidal Metals (Silver, Mercury, Sulphur),
emor Sicc.' preps., Sulphur Colloidal, Sulphur Ung., Sulphur Hypochloritis
., Sulphur Iodid. Ung., Thymol Ung., 'X' Rays.
se plenty of hot water to the face and wash night and morning with soap
spirit—then Calamine Lotion and allow to dry on.—B.M.J. i./17,604.
acne vulgaris, intractable to ordinary treatment, gastric acidity should
ested. Cases with a low acidity benefit from a mixture containing dilute
rochloric Acid, Cascara Sagrada and Tincture of NuxVomica.—per Pres.,
, '26, 346.
ost cases are associated with seborrhœa capitis, with greasy scales contain-
the acne bacillus. Hence continued infection of the face probably takes
e from the scalp. A spirit shampoo should be used weekly.—H. G. Adam-
L. i./25,401.

cne Rosacea.—*Finsen Light and 'X' rays.*

cromegaly.—Pituitary Extract, Thyroid Extract (guardedly), Potassium
de, and a Mercurial Salt (value doubtful except where there is a specific
).

Headache of, relieved by Antifebrin, Phenacetin, Exalgin, Magisal, Migralgin, Phenazone.

Sweatings of, by Zinc Oxide, Atropine or Picrotoxin.—L. i./09,28. See also **Elephantiasis.**

In nearly all cases there is a definite change in the pituitary gland which takes the part of an adenomatous overgrowth. For a useful account of the clinical signs and operative procedure, see J. A. Walton, B.M.J. ii./22,838. See also our page 965.

See also **Ateliosis.**—Therap. Index.

Actinomycosis.—Cupri Sulph., Sol. Argent. Nit. Injectio 20%, Potassii Iodid., or Sodii Iodid., Salicylates. Thomassen's Iodide Method, Iodi Injectio, Actino. Vaccine. *See also Vol. II.*

Argent. Colloidale, Cupri Sulphas, 'X' Rays.

Tincture of Iodine in milk (which forms a truly Colloidal solution). *Dose,* 5-10 minims in half a cup of water three times a day. 'Effect almost incredible.'—H. Chitty, B.M.J. i./26,419.

Radium treatment cured.—per Pres., Oct., '26,346.

Vaccine used in a case, the nidus of infection a carious tooth.—W. R. Judd, B.M.J. ii./26,887.

Addison's Disease.—Arsenic, Iron, Phosphorus, Suprarenal preparations. Adrenalin hypodermically may increase blood pressure a little.

Treatment at Guy's Hospital. Hydrochloric Acid 2 drachms thrice daily is required, made into a palatable drink with 8 to 10 ounces of water containing sugar and orange juice. *B. acidophilus* culture is given three times daily, and a tablespoonful of Charcoal morning and evening. An autogenous vaccine, prepared from the hæmolytic Streptococcus isolated from duodenal contents, is injected in increasing doses. Anæmia is treated by Arsenic, and when necessary by repeated transfusion, and the spinal symptoms by exercises. The best results can only be obtained by this combined attack on the infection.—A. F. Hurst, L. i./25,1212.

Adenoids.—Cod Liver Oil, Iodine, Iron, Liq. Ferro-Manganes. Pept. cum Hæmoglobin, Liq. Iodo-Ferro-Manganes. Pept., Syrup Iodo-Tannicus.

Locally.—Ammon. Chlor. Snuff, Glycerin vel Liquor Ferri Perchlor. Nasal Injection of Tannic Acid, Nebula (q.v.) 'X' Rays.

Orris Root Powder and Soap on septum to induce sneezing.

Adhesions, Fibrous, Peritoneal, etc., Injectio Thiosinamin et Phenazoni, Inject. Thiosinamin et Sod. Salicyl.

Adiposity. *See* **Obesity.**

Ague.—*See* **Malaria.**

Albuminuria.—Acid. Gallic., Agmel, Amyl Nitris, Basham's Mixture, Ferri Cacodylas, Fuchsine, Juniper Oil, Nitroglycerin, Vinum Diurecticum, Viscum.

Significance of albuminuria. *Per se* and as an isolated observation has little significance. In 50,000 fit soldiers protein was found in nearly 6%. Importance of Maclean's urea concentration test.—F. G. Chandler, Pr. July, 1921, p. 33. *Differential Diagnosis, see Vol. II.*

Alcoholism.—Acid Hydrocyanic, Ammonium Chloride, Arsenic, Atropina, Auri Chlorid., Capsicum, Chloral Hydras, Cinchona, Colloidal Gold, Digitalis, Hydrastis, Hyoscinæ Hydrobromidum, Hyoscyamus, Lupulin, Mistura Antidipsomanica, Mist. Belladonnæ Xanthoxyli et Hyoscyami, Mistura Ferri Aperiens, Mistura Magnes. Sulph. Co., Nux Vomica, Phosphorus, Picrotoxin, Pilulæ Capsici Co., Quinine Preps., Stramonium, Strychnine, Atropine and Strychnine hypodermically to keep the patient away from drink; Apomorphine if mad drunk. For insomnia of: Elix. Chloralamide.

D. E. Stanford Park on treatment of inebriety and drug habit.—L.i./22,691; ii./24,491, v. also our pp. 371 and 561.

USEFUL OUTLINE OF TREATMENT.

Calomel at bedtime, 'Salts' or Seidlitz in the morning. Acute gastritis is treated by ⅛ grain doses of Calomel every half hour for 5 hours followed by 'Salts,' Apomorphine hypodermically for acute alcoholism. Nervous patients receive Bromide well diluted *per os* and Strychnine 1/30 grain *hypodermically every six hours.* Suspend Strychnine after six days and give then ½ ounce every hour of the following mixture:—Tinct. Capsici 1 drachm, Liq. Extract of Quassia and Tinct. Ignatia (or Nux Vomica) equal quantities 1¼ drachms, Water to 8 ozs.—A. M. Rosebrugh, B.M.J. i./14,704.

Ammon. Chlor. is an antidote to excess.

he following is a useful ‘draught’ on the morning after a ‘big dinner’:—
ii Bic., Pot. Brom. *aa.* gr. 20, Tinct. Card. Co., Tinct. Gent. Co., *aa* 1 drachm.
ad 1½ ozs. (Calomel 5 grains if bowels not already loose).—C. D

lkalipenia.—*with reference to acidosis, as observed in children.* **It was** id that a normal adult wants approximately 75 grains (5 Gm.) Sodium rbonate to render the urine alkaline. The urine of an infant will be line after giving 20 to 40 grains. In acidosis approximately 100 Gm. re quired to produce an alkaline urine—in severe cases even up to 200 Gm. r 200 Gm. death ensues. Before the onset of true acidosis there must be pletion of 20, 30 or 40 times the normal quantity.—A. D. Symons, L. ,627.

lopecia.—Arsenic, Hæmoglobin, Humagsolan, Iron, Pilocarpine, chnine, Thyroid Gland (Standardised) Preps., either Tabs. or Liquor.

ocally.—Ammon. Liquor, Amyl Nitrite with Pilocarpine Hair Lotion, Burt's d, Cantharides preps., Carbon Dioxide, High Frequency Current, Hydrargyri s, Hydrargyri Perchlor. vel Subchlor., Lin. Iodi, Liq. Carbonis Deterg. , Lotion c. Glyc. 10 %, Chrysarobin, Lotio, Capillaris, Lotio Balsami Peruvian, o Excitans, Lotio Resorcini, Lotio Ætheris, Comp. Baume Fioraverti, Lini- tum Jaborandi, Lotio Resorcin et Ac. Salicyl., Lotio Resorcin, Pilocarpin anthar., Unguentum Cadini, Ol. Cadini Aceticum, Oxygen, Petroleum it, Spiritus Acid, Lactic, ‘X’ Rays (small doses).

eborrhœic Alopecia treated with Saturated Solution of Sulphur in Carbon lphide (Inflammable).—Sabouraud.

menorrhœa.—Actæa and Cimicifugin, Aloes, Apiol, Cantharides, Caulo- lin, Corpora Lutea, Dewees' Mixture, Ergota, Ergot and Apiol Capsules, ir Ergotæ cum Ferro, Ferri Oleas Caps., Gosspyii Rad. Cortex, Guaiacum Apiol, Iron Salts, Manganesii Oxidum, Ol. Rutæ, Ol. Pulegii, Pil. Aloes lyrrh., Potass. Permang., Pulsatilla, Savin, Senecio, Tanacetum. Thyroid nd (Standardised Liquor and Tablets).

mœbiasis.—Auremetine, Ipecacuanha or Emetine Injection or ‘Stear- s’ or Salol-coated pills of Ipecac., Emetol, Emetine Periodide, or Emetine nuth Iodid. See also **Dysentery.**

næmia.—Alginoid Iron, Arsamin, Arsenic, Benzol Capsules, Cacody- ., Calcii et Ferri Glycerophosphas, Calcii Fluoridum, Calcii Hypophosph. ii Phosph., Chlorophyll preps., Cholesterin, Corpora Lutea, Elix. Gent. ia, Elix. Hæmoglobin, Ferri Bromid., Ferri Perchlorid, Liquor Ferri ophosph., Ferri Iodidum, Ferri Oleas Caps., Ferri Perchlorid., Food parations (various), Glycerol Glycerophosphatum, Ferri Phosph., Ferri h., Ferrum Dialysat., Ferrum Redactum, Glycerol Glycerophosphatum Medulla ruba, Hæmoglobin preps. and Capsule, Ferrocarnis, Lecithin ir and Emulsion, Liquor Ferri Albuminati, Liquor Ferri Peptonati, Liquor i-Manganesii Peptonat, Liq. Iodo-Ferro-Manganes. Pept. Liq. Ferro- ganes. Pept. cum Hæmoglobin, Magnesii Peroxidum, Maltolivine, Man- ese Citrate, Marrubin, Malted Glycerophosphates, Nucleinic Acid, Ol. rhuæ, Phosphor, Pil. Ferri Carb., Pil., Ferri Sulph., Quinine preps., Quinin erri Chlor., Radiostol preps., Saccharum, Sirop Neurotonique, Sodii Hypo- phis., Spleen Substance Desicc., Strychninæ Cacodylas, Syr. Iodo-Tannicus, ipus Tann-Iodo Phosphoratus, Syrupus Trium Phosphatum, Trilactine, im Tann-Iodo Phosphoratus.

eukæmia successfully treated by inoculation of malaria, 3 Cc. of blood from alarial patient being injected subcutaneously.—per Pr., June, '26,433.

næmia, Pernicious.—Arsenicals, Benzol Capsules. Four Gland Tablets.

he ***New Liver Treatment,*** see p. 962.

, is stated that Iron is an absolute poison—the liver already contains ss to draw upon—but arsenic does good.

chlorhydria regarded as the fundamental predisposing cause. Hydro- ric Acid in large doses should always be tried.—T. Houston, B.M.J, 4,1209. Pres., Jan., '27,3.

epeated doses of Calomel 2 grains, at first twice a week for six weeks, rwards once a week for further six weeks, and finally once a month. rovement most marked.—J. C. Ferrier, B.M.J. i./21,932.

eatment should consist of radical oral sepsis, administration of Hydro- ic Acid, regular use of sour milk, and inoculation with a vaccine made Streptococci, isolated from patient's duodenum by means of a Ryle's .—A. F. Hurst, B.M.J. ii./22,978.

Coli and B. Welchii present in unusually large numbers in practically every one of 33 cases of pernicious anæmia.—Jl. Infect. Dis., per Jl. A.M.A., ji./25,1003.

For Blood Counting and Staining see Vol. II.

Anæsthetics by inhalation.—A.C.E., Acetylene, Æther (and with Alcohol and Oxygen, and Gas and Oxygen), Æthyl Bromid., C.E., Æthyl Chlorid., and with Nitrous Oxide, Æthyl Iodid., Chloroform (and with Oxygen and Hyoscine-Morphine), Ethanesal, Ethylene, Nitrous Oxide, Somnoform. For a 'rough sketch' of Chloroform Administration v. p. 285.

Gas and Oxygen extremely useful, many cases being dealt with which would not stand a more toxic drug.—Sir Crisp English, B.M.A., L. ii./23,302.

Vernon-Harcourt Regulator, see p. 285; Shipway's App., p. 285.

For treatment if danger arises with Chloroform, see p. 286; with Ether p. 103, with Ethyl Chloride, p. 111, and Nitrous Oxide, p. 146.

Heart arrest.—Adrenalin by intracardiac injection or intravenously.

Anæsthesia, Intra-Spinal, see Kerocain, Stovaine, etc.

Anæsthetics, Local.—*Æther, Acid. Carbolic, Adrenol (throat spray), Adreucaine, Aethyl Chlorid., Alopon, Anesthone, Anestiform, Anestile, Apothesine, Butyn, Benzamine, Cocaine (and Substitutes), Cocaine Ionised, Eudrenine, Erythrophlœinæ Hydrochloridum, Ice, Kerocain, Menthol, Methyl Chloride, Papaverine, Paraldehyde (intravenous), Phenolaine, Quinine, Quin-Hydrochloro-Carbamid., Stovaine, Tropacocaine, Tropacocaine Infiltration and Intraspinal Injection, Scopolamine Morphine Injection, also Scopolamine—Morphine—Atropine. Magnesium Sulphate Intraspinal Injection. Stovaine with Dextrin (Tyrrell Gray), also with Strychnine (Jonnesco). Æther-Saline intravenously, Ether in Oil per rectum.* (Many of these are, of course, *injected.*)

Potassium Sulphate 0·5% added to local anæsthetics for intraspinal injection enhances action.

Anal Fissures *(Locally).—Belladonna Ointment, Carbolic Acid, Glycerin Aloes, Ichthyol, Iodoform Suppositories, Quinine HCl. packing and suppos, Ung. Conii.*

Analgesics - Anodynes.—Acetanilide, Atropine, Belladonna, Butyl Chloral, Camphor, Cannabis, Chloretone, Cocaine and substitutes, Codeine, Conium, Gelsemium, Hyoscyamus, Hyoscine, Morphine, Opium, Orthoform, Phenacetin, Phenazone.

Locally.—Methyl-Aspriodine, Ung. Methyl Salicyl. Co.

Anaphrodisiacs.—Bromides, Iodides, Opium, Belladonna, Hyoscyamus, Salix Nigra, Stramonium purgatives.

Aneurism.—Aconite, Amyl Nitris, Calcii Chlorid., Digitalis, Ergotina, Iodoprotein Tabs., Morphine, Nitroglycerin, Potassii Iodidum, Veratrum. *Gelatin Injection.* Diagnosis.—'X' Rays.

Angina Pectoris.—Aconite, Æther, Æthyl Iodid., Alcohol, Amyl Nitris, Arsenic, Chloroform Inhalation Capsules (not with low blood pressure), Digitalis, Digitalin cum Nitroglycerin Tabellæ, Erythrol Nitrate Tabellæ, Hoffmann's Anodyne, Hydrogen Perox., Ibogaine, Mannitol Nitrate Tabellæ, Morphinæ inj. hypod., Nitroglycerini Liquor and Tabellæ, Papaverine, Phenazone, Sodii Nitris, Sod. Theobromine-Sodium Iodide. Tab. Sodii Nitritis Comp., Theobromine, Theobromine Aceto-Salicyl, Theobromine Sodium Salicylate, Trilactine.

The victim of angina pectoris may have a blood pressure considerably above normal. The failure of Nitrites to give relief is of bad omen.—F. de Havilland Hall, B.M.J. ii./19,496.

The following powder recommended for treatment: Aspirin 3 grains, Quinine Valerianate 3 grains, Caffeine 2/5 grain, Powdered Opium 1/5 grain—to be given in a cachet every two hours.—per Pr., Mar., '27,201.

Angina, Pain of.—Amyl Nitrite. Carbonic Snow.

Ankylostomiasis (caused by Ankylostomum duodenale).—Carvacrol, Carbon Tetrachlor, Eucalyptus Oil, Filix Mas. Ol. Chenopodii c. Thymol, Pelletierine, Podophyllin, Tablets Betanaphthol and Phenolphthalein, Terpine, Tetrachlorethylene, Thymol (not suitable for the old or very young), Thymol Carbonate.

Betanaphthol in the treatment of hookworm disease. 397 prisoners in Ceylon (showing on examination an infestation rate of 93·7%) were treated with the drug. "Microscopic cures" effected in only 31·6% after one treatment and 38·1% after second treatment. No untoward effect with 50, 60 and 75 grain doses of the powdered drug.—C. N. Leach and G. E. Hampton, per Jl. Trop. Med., May 1/23,145. See also Sept. 1, 22,285.

ıkylosis. *Locally.—Chlorine from Sodium Chloride, also other drugs, by sation.*

ıorexia.—Calumba, Capsicum, Cascarilla, Chiratta, Cinchona preps., tian, Ignatia, Nux Vomica, Quassia, Quinine, Strychnine, Sur. Kolæ Comp.

ıthrax.—Acid. Carbolic, *Camphor Injection, Iodi Tinct. Inject. vo's Serum.*

ıthelmintics.—See **Worms.**

ntidotes.—See Chapter; they are also fully referred to in the text; see list of *Emetics* in this Index.

ntipyretics. See **Fever.**

ntiseptics for Hands, Instruments, etc. (See also Chapter on).—*. Boric, Carbolic, Alcohol, Bacterol, Clove Oil, Diffusol, Ether Soap, nosyl, Harrington's Solution, Hyd. Biniod, Hyd. Oxycyanid., Hyd. Per-., Iodine Tincture (q.v.), Izal, Ol. Sinapis (much diluted), Perfumed For-ıls, Phenoloid Disinfectant, Tannin in Alcohol, Thymol Disinfectant.*

ntiseptics for Wounds.—*Acid. Boric. Lotio and Ung., Acid. Carbolic o and Ung., Acid. Salicylic, Lotio and Ung., Acriflavine, Alcohol 75% iliser of skin), Allantoin, Aluminii Acet. Lotio, Anserin Mulls medicated, tol, Benzoin Co. Tinct., Brilliant Green, Bromphenobis, Cheatle's Green ıy, Cloramine T., Collodium, Colloidal Metals, Dakin's Solution, Diffusol, ad, Eusol, Formosyl, Glycerinium Iodoform, Hydrarg. Biniod., Hydrarg. hlor., Lotio Iodoform, Iodoformi Emuls., Iodoform Wool and Ung., Iodol, ne in Spirit, Iodised Carbon, Iodine Colloidal, Izal, Kelly's Paint (Collod. zoin), Liq. Hydrogen Peroxidi, Mercuro-Zinc Cyanide, Mercurome, Per-ride Solubes, Petrolei Cerat., Phenol and Camph. combined, Potass. Permang., rcin, Menciere's Solution, Malachite Green (and with Sublimate), Proflavine, ıl,* see Chapter on Antiseptic Values, Vol. II., and Chapter on *Wounds* in Index.

ntiseptics, Intestinal.—Acid. Boric, Acid. Carbolic, Acid Iodic, Asprio-, Benzonaphthol, Bisciniod, Bismuth Salicylate, Calcii Sulphid. Stearettes, oo Ligni, Dimol, Ichthyol, Ichthoform, Kaolin, Koumiss, Mercurials, hyl-Aspriodine, Myrtillus, Naphthalene, Naphthol, Phenol-Bismuth, nyl-Aspriodine, Pil. Bism. Sod. Sal. and Salol, Quinine Acetyl-Salicyl, ıine Salicylate, Salacetol, Salol, Sedasprin, Sodii Hyposulphis, Sod. Oleat Capsules, Sulphocarbolates, Trilactine, Trilactine Milk, Tylcalsin, Tylmarin, marin-Quinine.

any of these drugs may be prescribed for local action in Stearettes and magules, *q.v.*

ntiseptics for the Mouth. Formalin Tablets (Internal). Formosyl ıth Wash, Hydrogen Peroxide Mouth Washes, *q.v.*, Liq. Antisepticus, rmaglycin.

ntiseptics, Urinary.—Acid Iodic and Iodates, Benzoic and Boric Acids, tazol, Salol, Hexamine, Hexamine-Resorcin, Hexyl-Resorcin, Mercurome urethral injection), Methylene Blue, Tylmarin, Uro-hexoids, Vesalvine and 'B.' See also Cystitis. Zinc. Sulphanilas (urethral injection.)

ntispasmodics.—See **Asthma, Convulsions and Epilepsy.**

nuria, see **Urine, Retention of,**

ortic Disease.—Ammon. Carb., Camphor Injection, Erythrol Nit. ellæ, Ferri Iodid., Ferri Perchlor., Iodides, Nux Vomica, Sodii Salicyl., . Nitro-glycerin et Sodii Iodid. cum Arsen.—See also **Angina Pectoris.** Test for Syphilis: Anti-syphilitic treatment.)

phonia.—See **Voice, Loss of.**

phrodisiacs, see **Debility and Nervous Debility.**

phthæ.—Bismuth preparations, Gentian Violet, Iodine Colloidal, Iodo-n, Mineral Acids, Quinine preps., Sod. Bisulphis, Sodii Chloras, Sodii phis. Tab. Formalin to suck.

ocally.—Acid. Boric, Acid. Sulphuros, Alumen, Borax, and Glyc. of, Dakin's ution, Formaldehyde Pigment, Iodol, Lotio Nigra et Glycerini, part. æq., ass. Permang., Sodii Chlorinat. Liquor.

hrush treated by swabbing with Gentian Violet solution 1%.—per Pr., ., '27,393.

ppendicitis.—Combined use of Belladonna and Salicylates (*see* Tinct. lad.).

urgative *e.g.*, Castor Oil or Calomel 2 gr.; Ice bag, Magnesia, Bismuth Sub-ate; Mercurial Ointment to the flank, Codeine if pain excessive, diet and regulation of bowels.—Robin's treatment. *Glycerin Bellad. and hot fomentation alternately.* Move the bowels not before the 4th or 5th day and not until the 7th if abscess forming, when Calomel and a Saline Aperient should be given if necessary. A Saline mixture with Hyoscyamus is useful.

Causation, diagnosis and treatment.—A. Rendle Short, L. i./25,215,269.

Castor Oil should *not* be given as it further inflames the already irritated gut and thus accelerates the pathological changes, causing the appendicitis to take a more violent course than it otherwise would. Analysis of 50 cases. —G. M. Tanner, L. i./27,970.

Appendicitis, Threatened.

For incipient, Elixir Agrimoniæ Co., Trilactine.

Why and how to preserve the appendix.—Keetly, L./09,1.

Rest, starvation and Morphine ' will probably clear up the typical mild case in two or three days. Some say on no account give opium.

300 cases of appendicitis.—Sir G. T. Beatson, Glas. Med. Jl., Nov., 1912

Nasal sinus infection as a causal factor in appendicitis.—P. Watson-Williams, Pr. April, 1921.

Basuto negroes in Orange Free State do not suffer from.—B.M.J. i./23 1116.

Arterial Tension, Raised.—Aconite, Antimonial preparations, Potass. Iodidum, Pulv. Sodii Nitritis Comp., Sod. Sulphocyanide, Veratrum Viride.—See also **Arteriosclerosis, Blood Pressure and Vasodilators.**

Arterial Tension, Lowered.—Pituitary Gland Preparations raise tension of the blood vessels.—*See* **Cardiac Tonics.**

Arteriosclerosis.—Adrenalin, Aspriodine, Benzoates, Calc.-Theobromine Salicyl., Camphor, Citrates, Coramine, Erythrol Nit. Tabellæ, Iodoprotein, Iodogluten, Peptone, Sodium Hyposulphite, Sodium and Magnesium Sulphates, Syrupus Iodo-Tannicus, Iodolysin (Inj.), Thyroid preps., Trilactine; Depressor Agents, *e.g.*, Chloral Hydrate Hippurates, Potassium Iodide, Nitroglycerin Tabellæ, Tabellæ Sod. Nitritis Co. For pre-sclerosis Diuretics, finally Theobromine and Digitalis.

Strophanthus and the Hippurates give good results. Vasodilators should not be used in advanced cases.—L. i./13,1315.

The most useful drugs are Amyl Nitrite, Nitroglycerin, Erythrol Nitrate and Sodium Nitrite.—W. Lyne Blight, L. i./15,1167.

Arteriosclerosis and Bright's disease are too closely associated to suggest a chance coincidence and many observations point to the conclusion that one or more of the causes of Bright's disease are concerned in the production of arteriosclerosis.—Geoffrey Evans, Pr. Jan. 1922, p. 38.

Nature and Classification of types of arteriosclerosis.—Goulstonian Lectures, Geoffrey Evans, B.M.J. i./23,454, 502, 548; L. i./23,579.

Avoid excess of readily fermentable carbohydrates. Give green vegetables and fruits.—W. E. Deeks, Diet and Disease, 1927.

Arthritis—*See* **Gout and Rheumatism.**

Arthritis Deformans.—Iodine Ionised, Sulphur injected. Peptone intramuscularly.

Treat as in early phthisis—Cod Liver Oil, Creosote, Guaiacol, tonics, hæmatinics. Later, Iodine and Iodides.—C. W. Buckley, Pr. June 22/412.

Sulphur metabolism in arthritis deformans.—A. P. Cawadias, L. i./27,1283.

Ascarides.—See **Worms.**

Asthma.—Try to find causes.—Renal, etc.: sensitiveness to proteins. Adrenalin subcut., Æthyl Iodid., Amidopyrin, Ammon. Brom., Amyl Nitris, Antimony, Arsenic, Aspriodine, Atropine, Valerianate, Belladonna, Bromides, Caffeine, Caffeine Tri-Iodide Cap. (Billimoria), Calcii Chlorid (?) *q.v.*, Calc. Brom. intrav., Calc. Theobromine Salicyl, Cannabis, Chloral Hydras, Chloroform, Coca and Cocaine Salicylas, Codeine, Coramine, Ephedrine, Erythrol Nitras, Euphorbia Peplus et pilulifera, Ext. Grindel Co., Grindelia, Hyd. Salicyl Coramine, Hydrarg. Subchlorid., Hyoscine, Iodinol, Iodoprotein Tabs., Jaborandi, Lobeliæ Tinct. and Tinct. Ætherea, Lobeline, Manganese Butyrate, Mannitol, Menthol, Naphthol, Nitroglycerine, Papaverine, Paraldehyde, Peptone Injections, and *per os*, Physostigma, Pilocarpine, Potass. Iodidum, Rutæ Confectio, Salol, Sedasprin, Sodii Iodid. and intravenously, Sodii Nitris, Tabs. Sod. Iodid. and Sod. Nit. combined, Solanine, Stramonium, Spiritus Grindeliæ Co., Strontii Iodid., Syr. Pilocarp. et Pot. Brom. Tabellæ Antiasthmaticæ, Tylcalsin. An emetic may afford great relief.

Aspirin relieves some cases; in others unsuited.—B.M.J.E. ii./22,33. It

es the mucous membrane of the nose and therefore possibly aborts attack
reducing bronchial secretion.—Clin. Jl. Jan. 17/23,35.

Acid. Sulphuros. Vapor, Adrenalin—as spray. Oxygen has been injected.

Vaccine B. Influenza, Pneumo., Strepto., M. Catarrh., or M. Paratetrag.
. to predominant organism present, preferably Autogenous.

By Inhalation.—Ammonii Bromidi Vapor, Arsenical Cigarettes, Chloroform
por, Coca or Eucalyptus leaves smoked, Compound Asthma Fluid (as spray),
beb Cigarettes, Ozonic Inhaler, Potass. Nit. fumes, Pulvis Lobeliæ Co., Pyridine,
amonium fumes, Vapor Coninæ.

Grindelene does good in severe attacks of asthma. For all chronic con-
ons nothing so good as a combination of potassium iodide 5 grains, and
gnesium sulphate 1 drachm, in 1 ounce of water thrice daily, 2 hours p.c.—
Jepson, B.M.J. ii./17,650.

toxæmia due to overcrowding.—James Adam, B.M.J. i./18,113.

Adrenalin 5 to 10 minims injected three or four times a day good. Begin
en the breathing is pretty bad.—B.M.J. i./16,36.

Patient's own blood 5 to 10 Cc. **subcutaneously in asthma and** in migraine.
C. H. Wildish, B.M J. ii./21,598.

Horse Serum (*q.v.*) is contraindicated in asthmatics.

The bronchiole can be relaxed by paralysing the vagal terminations (Atro-
e or Hyoscine), by stimulating the sympathetic (Adrenalin or Cocaine),
l by relaxing plain muscle (Amyl Nitrite, Benzyl Benzoate, Papaverine).
e drugs can be given by injection (Atropine, Hyoscine, Adrenalin, Cocaine,
feine), by inhalation or spray (Atropine, Cocaine, Adrenalin, Nitrites,
nzyl Esters). Asthma Powders should be avoided, as they tend to set up
nchitis; and *per os* (Atropine, Benzyl Benzoate).—P. Hamill, B.M.J.
25,369, *q.v.*

f specific determining factor can be determined, either remove or avoid it,
immunise specifically by injection of minute doses or non-specifically by
ptone. Chronic bronchitis makes patient more sensitive. Attacks less
ble when general condition good.—P. Hamill, B.M.J. ii./25,205.

Old Tuberculin has been injected.—B.M.J.E. i./26,12, but this is empirical.

The treatment of asthma.—R. N. Chopra and H. W. Acton, I.M.G., Mar.,
,101.

An all-round attack recommended, *i.e.*, consideration of psychical aspects,
nove sources of peripheral irritation, employ exercises for chest development,
ensitise where practicable, restore balance in favour of the sympathetic, or
end to general hygiene.—W. Langdon Brown, B.M.J. ii./25, 205.

Apshyxiating Gas.—*See* **Antidotes to Poisons** at end.

Ateliosis or Lorain's Disease.—This condition may be regarded as the
ct reverse of gigantism. It occurs generally early in life. The patient
nains small and stunted and never arrives at full development. Cases
e improved after the pituitary gland has been entirely removed.—J. A.
lton, B.M.J. ii./22,839.

Auricular Fibrillation.—Digitalis, Quinidine. See also Cardiac Tonics.

Aural Discharge.—Hexamine (?), *Potassii Cantharidas (q.v.).*

Trichloracetic Acid for closing of perforations.

Bacilluria (B. Coli).—Collargol, Hexamine and Sod. Phosph. Acid (separ-
ly), Hexyl Resorcin, Sandal Wood Oil, Vaccines, make urine alkaline, *e.g.*
h Pot. Bicarb. or Sod. Cit.

Balanitis (*Locally*).—*Lotions of Lead Acetate, Zinc Salts, Silver prepara-*
s, Tannin, or Zinc Oxide Powder.

Basedow's Disease—See **Exophthalmic Goitre.**

Bed Sores. *Locally.—Acid. Tannic, Alcohol, Allantoin, Anserine Mulls,*
licated, Argent. Nit. in Nitrous Ether solution, Glycerin, Glycerin Aloes,
oform Gossyp. and Ung., Iodine Colloidal, Peruv. Bals., Perfumed Formosyls,
nnin, Iodoform and Starch Powder, Resorcin, Sphagnum, Symphytum Preps.
g. Rusci Co.

Beri-Beri.—Extract. Oryzæ Liq., Rice Bran, Phaseolus, Strychnine.
P. Manson (Tropical Diseases Manual) dwells on the importance of *Diet.*
e should be eliminated. Vitamine-rich food (beans, peas, barley), wheaten
r,—not overmilled—oatmeal to be substituted. Apart from other con-
erations, rice as food is too bulky. Yeast and rice polishings extract said
e curative. *Nitroglycerin* in full doses if acute cardiac distress. If sudden,
yl Nitrite.

Strychnine, Arsenic, and Silver Nitrate are in repute as soon as the muscular hyperæsthesia has subsided. A routine which has found some favour is the following :—

Magnesium Sulphate 60 grains, Dilute Hydrochloric Acid 20 minims, Tincture of Orange 1 drachm, Infusion of Calumba to 1 ounce. Thrice daily for a week, and repeated after a few days intermission.

If much œdema, the following may be of use :—

Solution of Ammonium Acetate 1 drachm, Potassium Nitrate 10 grains, Potassium Acetate 15 grains, Camphor Water to 1 ounce. Thrice daily.

If the heart shows signs of failure, a mixture of Digitalis, Ammonium Carbonate and Compound Spirit of Æther may be used with advantage.—Brooke.

See also **Accessory Food Factors** in this Volume and Vol. II.

Bile, Deficiency of.—Ammon. Chloride, Bismuth and Opium, Chirata, Colalin, Fel Bovin, Hepatic Stimulants and Antiseptics, *e.g.*, Elix. Gentian Acidum, Salol, Hydrarg. cum Creta, Pancreatised Milk, Sodii Glycocholas, Sodii Phosph. Efferves., Sodii Sulph. Efferves., Sodii Salicylas, Taraxacum.

There are only two substances known which are really cholagogues; bile itself and Sodium Salicylate.—P.J. ii./21,490.

Bilharzial Disease.—Antimony Pot. Tart. intravenously, also Antim. Soda. Tart., Antim. Ox. Inj., Auremetine, Emetine Periodide, Emetine Injection, Hydr. Perchlor., Methylene Blue, Thymo-benzene.

Disease prevalent in China (10,000,000 infected), Africa, S. America and Japan. Estimated that of 6 million cases in Egypt over 5 million could be cured by Antimony.—J. B. Christopherson, L. i./24,1071.

Intestinal bilharziasis is threatening to destroy the vitality of the inhabitants of the W. Indies, both white and black. The mollusc which serves as the intermediary host is one of the Planorbidæ, *sp. antiguensis*, Reeve, found in streams and pools. S. B. Jones, Jl. Trop. Med. Aug. 1/23,254.

Biliary Concretions.—See Gall Stones.

Biliousness (See also Constipation).—Calomel, Chirata, Colalin, Elixir Gentian Acid, Euonymin, Iridin, Leptandrin, Podophyllin, Sanguinarin, Seidlitz Powders, Sodii Phosph. Efferves., Sodii Salicyl, Sodii Sulph. Efferves., Sodio-Magnes. Sulph. Eff., Taraxacum Cocoa.

Magnesium Sulphate 5 Gm., with Peptone 2 Gm., and Licorice Powder 1 Gm., in half a glass of tepid water, stated to be a very active remedy for evacuation of bile from the liver, as well as from the bile-ducts and gall-bladder. Effect enhanced by adding Vichy Water or 2 tablespoonsful of Glycerin. Kaolin, 5-10 Gm., may also be added. After taking, patient should lie on right side for 10 minutes and wait half-an-hour before breakfasting. Treatment continued for 10-15 days in each month.—per Jl. A.M.A. ii./25,551.

Bites and Stings (Insects,—Mosquitoes, etc.). *Locally.—Ammonia, Cocaine, Emp. Bellad., Eucalypt. Ol. (to ward off), Formalin rubbed in, Formosyl, Hydrogen Peroxide, Moskitin, Ol. Betulæ (with Olive Oil), Onion Juice, Phenol, Pulegii Oleum, Sodii Bicarb., Spiritus Chloroformi, Thymol, Vinegar. Citronella Oil with Carbolic Acid good in warding off mosquitoes.*

Mag. Sulph. Sol. 1 in 20. Rub the skin with it to *keep off* insects.

The *Quinine Acid Hydrochloride and Cod Liver Oil* ointment under Sunburn is advised.—B.M.J. ii./26,718.

Cod Liver Oil has been found to have a specific toxic action on all flies and upon mosquitoes and ticks. It destroys all the flies that it even touches. Sprinkled on the surface of water it is more effective than Petroleum in the destruction of larvæ.—Lang, P.J. i./14,593.

The wasp sting poison besides its toxic effect on the heart diminishes the coagulability of the blood. Calcium lactate in 20 grain doses two-hourly and Cardiac stimulants effective.—P.J. ii./13,559.

A mixture of Cedar Wood Oil 1½, Citronella Oil 3½, with Spirit of Camphor to 8 as a prophylactic against mosquito, midge and fly bites. Hot boric fomentations to be used as early as possible if sepsis occurs. The sting of a bee or wasp should first be removed, and in the case of a bee Ammonia applied, and of a wasp an acid, *e.g.* Vinegar. Tincture of Aloes with solution of Cocaine useful. The bee's sting stated to contain Formic Acid with an organic base, which is lipoid in character and behaves like a hæmolytic saponin. The treatment of insect bites and stings.—A. C. Roxburgh, L. i./27,1146.

Pastilles for burning have been advised, made of the following : Phenol 6 drachms, Potassium Nitrate 1½ ounces, Insect Powder 5 ounces, Charcoal

10 ounces, and Mucilage of Tragacanth sufficient quantity. A sponge dipped in Spirit of Camphor will also impregnate the air and act as deterrent.—Ind. and East. Drug., Oct., '25, 238.

Viper Bites.—Calc. Chlorid. intravenously. *See also* **Snake Bites.**

Fly Prevention.—The following have been advised for destruction. For **rubbish heaps**, etc., Chloride of Lime, Sulphate of Iron either powdered or in 20% solution, Borax, Colemanite (crude Calcium Borate), Slaked Lime, Potassium Permanganate. For *use indoors*, Formalin, Alcohol and water. As deterrents, Pyrethrum, Paraffin, Cresol, Carbolic Acid. For spraying outside walls or canvas of hospitals, etc., a solution of Sodium Arsenite 1 lb., Honey 2 lbs., Treacle 2 lbs., Water 2 gallons. Use in the evening or early morning. Another formula is Commercial Formalin 1 ounce, water ½ pint, milk ½ pint. Fly Exhibition, Zoological Gardens, C.D. June 5/1915.

To kill flies a 1% solution of Sodium Salicylate is better than Formalin. Of the latter 1·25 to 2·5% of *Commercial Formalin* is the best strength.

Formaldehyde as a poison for house-flies. Efficacy stated to be due to its freedom, when exposed, from Formic Acid, and to a less extent from Methylamine. Formula recommended: 40% Formaldehyde 5, Lime Water 50, Sugar 2·5, Water 42·5. Should be exposed in a trap protected from air, and the prevention of flies falling in, thus making it acid, is advised. A blotting paper trap is shown.—Lloyd, T.D.B., Vol. 17, 1921/123.

The Minnesota Fly Trap is useful. Burning pyrethrum or vaporising Cresol (½ oz. in a moderate sized room) will drive flies away.—B.M.J. i./15,1006.

Berlece's Solution.—Sodium Arsenite 20 Gm., Treacle 100 Gm., Water 1 litre. Steep grass in this and hang it up.—B.M.J. i./15,1006.

Powdered Hellebore (Veratrum Album and V. Viride) ½ lb. to 10 gallons of water applied at the rate of this amount to 8 bushels of manure is an effective larvicide. Has no injurious effects on the manure or plants.—U.S. Dept. of Agriculture, L. ii./15,559.

Insectifuge.—To prevent flies from settling on man and horses.—Pyridine 1, Thymol ½, Safrol 5, Oil of Birch Tar 5, Sperm Oil to 100. The Birch Oil and Safrol mask the odour of Pyridine. Does not irritate the skin. A small quantity to be smeared on the temples, behind the ears and on the head or on leather of harness.

Kerosene is also effectual.

The following Spray Solution should be useful:—

Naphthalin 10, Phenol 10, Camphor 5, Lemon Oil 5, Thyme Oil 2, Lavender Oil 2, Savin Oil 2, Methylated Spirit to 500.

Aloes is a local sedative as in Friar's Balsam. A saturated solution in Tincture of Tolu is good against insect bites.—F. W. Cock, B.M.J. ii./18,256.

Flies dislike the colour *blue*. Use it as much as possible to ward off—especially as a preventive of acute poliomyelitis.—B.M.J. ii./21,230.

Sanodora Pads may be useful.

Potassium Cyanide has been used to kill larvæ in pools. *Pine Oil* is said to deter Anophiles. *See also* **Malaria** Chapter, Vol. II.

Jelly Fish Stings.—*See* p. 706.

Scorpion Stings.—Lister Institute supplies *Anti-Scorpion Serum*, consisting of the serum of horses which have been immunised against venoms of Egyptian scorpions, preserved with 0·8% Phenol. Dose equivalent to 10 Cc. of original serum. The injection should be made directly into the site of the sting, or as much as convenient, without causing pain, should be injected and the remainder of the dose injected in some convenient portion higher up the limb, as when the sting is, for instance, in a finger. The injection should be made as soon as possible after the sting.

Some sera, when kept under proper conditions, lose their potency slowly at the rate of about 8% per annum.

The relative rates of absorption of serum when injected intramuscularly and subcutaneously are 8 and 48 hours.

In the intraspinal or intravenous method of administration of serum, it is essential that it be warmed to 99-100° F. for injection.—Lister Institute. *See also* **Snake Bite Lancets.**

Blackwater Fever.—Caffeine Sod. Benz. Calomel, Eff. Saline, Intravenously Sodium Chloride, Quinine Acid. HCl. *per os* and intramusc., Digitalis, Sternberg's Mixture, Salvarsan, Strychnine, Cholesterin, Meth. Blue intrav.

A disease of metabolism the final stages of which, resulting in 'blackwater,' are intensely influenced by any process of pyrexia coincident with it or preceding it.

Treatment.—Keep patient warm, sponge with warm water; in case of pyrexia, sponge with cold water, with Vinegar and Lime Juice added, keeping the brain cooled by compresses. On signs of cardiac failure small doses of champagne or brandy and soda water given—soda water could be taken *ad lib.* Warm blanket baths for delirium or rising temperature. A mixture containing the following has been used with good results: Spirit of Nitrous Ether, Potassium Bicarbonate and Potassium Nitrate. In case of bad malarial history or anæmia without such, 1 grain doses of Quinine should be given in addition, alternating with mixture, as soon as stomach can stand it. Suggests trial of Thyroid to stimulate lymphoid system.—G. Rome Hall, Jl. Trop. Med., April 16/23,120.

Further Note on treatment:—Calomel 5 to 10 grains, Effervescent Saline. Intravenous injection of Normal Saline Solution, Quinine in nutrient enema (not milk), also Digitalis, and Strychnine in the same form.

Presence of spirochætes in blood of two Europeans suffering from blackwater fever. Experiments on guinea-pigs showed that disease can be transmitted by means of blood or liver extract—guinea-pigs died seven days after inoculation.—M. Blanchard and G. Lefrou, per Jl. Trop. Med., Jan. 15/23,33.

A case of, at Hull. Patient had resided in the Belgian Congo and had had several attacks of malaria. On admission to nursing home semi-comatose, delirious, in prostration, with frequent vomiting, marked jaundice and with passage of almost black urine. Rectal Salines, Camphor in Oil, Strophanthin, Tinctura Iodi, Bismuth, Adrenalin (to stop vomiting). One should watch the heart, give fluids, stop vomiting, watch for complications, especially suppression of urine, syncope, hyperpyrexia. Quinine should not be given, as it may increase the hæmolysis.—Stanley E. Denyer, Clin. Jl., Oct. 3/22.

Sternberg's Mixture. Sodium Bicarbonate 10 grains, solution of Mercuric Chloride 15 minims, water to 1 ounce. Every two hours for the first day and every three hours after until the urine clears. This in preference to ordinary diuretics.—D. G. Marshall, L. ii./18,417.

Even in severe cases the urine clears up more quickly with immediate subcutaneous injection of 5 to 10 ozs. of Normal Saline, and ½ to 1 oz. Magnesium Sulphate is beneficial for its depletive effects. The following mixture given every hour in 5 oz. of water prevents nausea and restlessness: Sodium Bicarbonate 20 gr., Bismuth Carbonate 10 gr., Tinct. Chlorof. et Morph. Co. 5 min. ('Sternberg's Mixture' causes vomiting, probably due to the Mercury.) Large quantities of fluid should be given, and on no account should patient be moved for at least 14 days.—E. P. Carmody, B.M.J. i./25,106.

Blackwater fever in London. An analysis of 14 cases studied during the last 7 years.—P. Manson-Bahr and E. G. Sayers, L. i./27,273.

See also Vol. II., special chapter on.

Blastomycosis.—Potassium Iodide a useful drug.—A. Castellani, L. i./20,943. Successfully treated by (1) Iodoform, (2) an ointment of Salicylic Acid, Ammoniated Mercury Ointment and Zinc Oxide, (3) B.I.P. ointment.—N. Cantlie, Jl. Trop. Med., Feb. 1/23,44.

Saline intravenously—1500 Cc.—A. Patrick, B.M.J. ii./18,404. *See also* Vol. II.

Bladder.—*See Albuminuria and Cystitis.*

Bleeding of Gums.—*Magnes. Lactas.* *See also* **Gums Inflamed and Spongy.**

Bleeding, to arrest—*See* **Hæmorrhage** and **Epistaxis.**

Blepharitis.—*See* **Conjunctivitis.**

Blistering Applications.—*Acetum, Collodium, Emplastrum and Liniment of Cantharides, Capsicum preparations.*

Blood Pressure, to Increase.—Pituitary Extract seems to have effect; next in potency is Caffeine. Calcium Lactate moderately effective and Strychnine disappointing. Digitalis to be reserved for cardiac cases.—L. i. 11,663.

Atropine, Camphor, Cotarnine, Digitoxin, Ergotoxine, and Strychnine are of no value. Adrenalin is dangerous, and should always be used with caution for this purpose. Physostigmine is effective, but as it gives rise to nausea, vomiting, and faintness, it should not be employed in cases of hypotension. Pituitary extract has no pressor effect.—A. Watson, Pr. Apl. 1915.

Blood Pressure, to Reduce.—

(i.) **Heart Depressants.**—Aconite, Arsenic, Mercury, Potass Salts, Quinine, Salicylic Acid, Veratrum Viride.

(ii.) **Vasodilators.**—Amyl Nitrite and Nitrites, Arsenic, Mercury, Quinine, **Salicylic Acid.—Sodium Luminal.—See also Vaso-dilators and Angina.**

(iii.) Purgatives.

High blood pressure, prognosis in. The Tycos manometers best.—A. Graham-Stewart, Pr. Aug. 1921, p. 183.

Raised blood pressure. The nourishment of the cardiac muscle is conditioned by the blood pressure in the aorta. A *plus* pressure often means increased cardiac vigour. A *minus* pressure often entails cardiac malnutrition. A *plus* should not always, as a matter of routine, be taken as harmful. *All* high blood pressures are not evil.—P. M. Chapman, Pr. Jan. 1921.

Blood-pressure in diagnosis.—Sir R. D. Powell, Pr., Jan., '26,42.

Thyroid and Manganese in abnormal pressure.

Blood, to increase coagulability of, see List p. 254.

Boils and Carbuncles.—Acid. Sulph. Dil., Alkalis, Arsenic, Bisciniod Calcii, Lactas, Calx, Sulphurata, Ferri Perchlorid., Hyd. Salicyl. Hypophosphites, Iodates, Fæxin, Manganese Colloidal injected, Mang. Butyrate, Nuclein, Ol. Tereb. in Oil Injection, Stannoxyl, Sulphides, Sulphur Stearettes, Sod. Silicas intrav., Sulphurous Waters, Syr. or Pil. Sulphatum, Trilactine, Yeast, Streptococcal, or Staphylococcal Vaccine.

Acidin : An albumen-HCl compound found useful.

Locally.—Argent, Nit., Belladonnæ Glycerin (as pigment and on poultices) Carbolated Camphor, Cataplasm Salicyl. Co., Cremor sicc. preps., Bismuth Oleas, Eupad, Hydrog. Perox., Glyc. Acid. Carbolic, Borated Hydrog. Perox., Iodo-Acetone, Iodine Colloidal Liq. Sodæ Chlorinat. Diluted, Linimentum Atropinæ, Mercurome Sulphur Iodide, Methysal Balm, Pot. Permang. Pencils, Sphagnol, Stanni Oleas, Thorii Oleat. Ung., Radium.

Subcutaneous injection in the abdominal wall of 10 Cc. Antistreptococcal Serum. Improvement rapid and complete, without destruction of tissue or scarring.—B.M.J. i./24,766.

Potassii Tart. Acid has been used as a dressing in Carbuncle.

Boils at once aborted by applying No. 88 Plaster Mull.—B.M.J. ii./26,814.

Botulism.—A form of food poisoning described by Van Ermengem in 1895. Symptoms correspond closely with those in so-called sausage poisoning met with in Germany and other countries where sausages and ham are eaten in an imperfectly cooked condition. Résumé of knowledge on, see B.M.J. i./18,511. Microscopically the *B. botulinus* is a straight rod shaped slightly motile organism producing spores and not unlike *B. anthracis* in appearance.—J. Stanley White, P.J. i./18,222.

Botulism—cases of so-called—indistinguishable from types of *Polio-Encephalitis* or more accurately Meningo-myelo-encephalitis. Exemplified in epidemics of the Heine-Hedin disease.—F. G. Crookshank, L. i./18,699, see also C. H. Melland, B.M.J. i./18,559, also Wilfred Harris, L. i./18,568.

The first appearance of botulism in Great Britain was in the Loch Maree food (sandwich) case. Bacillus Botulinus, being anaerobic could grow in a sealed tin of food, the taste and aspect of which would not be altered. —B.M.J. ii./22,481.

Botulinus Antitoxin.—Available from the Ministry of Health at various centres.

Dose.—Only large doses will save acute cases. Intravenously, dose, 20 to 50 Cc., previously warmed to body temperature, and injected very slowly. May be repeated daily, if necessary. To be used immediately upon appearance of symptoms, also prophylactically for persons who have consumed the suspected food 10 Cc. intramuscularly, to be followed by larger doses intravenously, if symptoms appear. Risk of serious symptoms from horse serum must be recognised. If such risk is likely, a preliminary dose of 0·5 Cc. of the antitoxin should be given subcutaneously.—B.M.J. ii./22,604; L. ii./22,732.

For the Paisley outbreak of milk poisoning due to *B. Aertrycke* see B.M.J. i./22,728 and Vol. II.

Botulism. Outbreaks in U.S.A. Patients were freely purged and received Potassium Permanganate internally.—B.M.J. i./22,893.

Doubt as to whether B. Botulinus is responsible for such outbreaks.—F. G. Crookshank, *ibid.* 974.

Bacterial food poisoning. Outbreak in Ireland due to consumption of infected milk.—W. D. O'Kelly, per Jl. Trop. Med., Mar. 15/23,95.

Bacillus botulinus infection of canned spinach. 0·5 Cc. of infected spinach juice *per os* killed guinea pigs in 18 hours. Of 174 samples taken from suspected lots bacillus botulinus (Type A) was found in 6.—S. A. Koser, per Jl. Trop. Med., June 15/22,208.

Foreign metallic substances in tinned foodstuffs. Danger of electrolysis. The 'couple' here is tin-iron, and, in many instances, Sodium Chloride, a good electrolyte, is present.—W. M. Willoughby, L. i./23,255.

Inoculation experiments with B. ærtrycke. Variations occur.—Prof. W. W. C. Topley, L. i./26,531.

Brain, Sudden Cerebral Lesions.—If gouty—Lithia, Potash with some diuretic, Nitrous Ether and Spirit of Juniper to which some Digitalis may be added—more if thrombosis is suspected than if hæmorrhage is probable.

If thrombosis be present, reduce blood coagulability, e.g., by lemon juice. (*cf.* p. 254). For hæmorrhage, chalk in a little suitable acid, *q.s.* to dissolve, to increase the tendency to clotting. Calcium Lactate or Chloride best if procurable in time. Arsenic hypodermically, *e.g.*, $\frac{1}{5}$ gr. Sodii Arsen.—Gowers.

Breast, Inflammation of.—All Antipyretics.

Locally.—Belladonnæ Ext. Glycerin. and Linim.

Breath Fetid.—Acid. Salicylic, Calcii or Pot. Permang., Camphora; Cremor Magnesiæ, Creosoti Vapor, Eff. Potass. Ap.c. Sulphocarb., Formosyl Mouth-Wash, Myrrh with Borax Tincture, Formalin Tablets to suck. Thymaglycin.

Bright's Disease. See **Nephritis.**

Bromidrosis.—Potassium Permanganate Wash. Perfumed Formosyls.

The following, described by Thin in 1880, said to be invariably curative.—Thoroughly wash the feet, dry and dust with Boric Acid Powder, then put on a pair of socks which have been steeped in a saturated solution of Boric Acid and dried. Shoes must also be powdered inside with Boric Powder. Each day soak the feet twice for 10 minutes at a time in Boric Acid Solution and continue as above.

Glycerin well spread over the soles and toes before putting on the socks—repeated as required. Successful. Prevents formation of noxious products. Swab with glucose (*q.v.*).—T. H. C. Benians.

See also **Perspiration, Offensive.**

Bronchiectasis.—Acid. Sulph. Dil., Creosote Inhaler, Hyd. Salicyl. *Diagnosis*: Lipiodol.

Bronchitis, Acute.—Aconite, Æthyl Iodide, Ammon. Acet. Liquor Antim. Tart., Apocodeinæ Hydrochlorid., Atropine Methyl Bromide, Codeine Jelly, Ether injections, Glycaphorm, Hexamine, Ipecacuanha, Ol. Cedri Atlantic, Oxygen, Papaverine, Squill preparations, Vesalvine 'S.'

Vapor Benzoin, Camphor or Eucalyptus, Counter Irritation, Ol. Succini.

Ol. Eucalypt. has been injected with Olive Oil.

Bronchitis Chronic.—Acid. Nit. dil. and Inhalations, Allium preps., Ammon. Carb., Ammon. Chlorid., Apomorph. Hydrochl., Aspriodine, Benzoates and Benzoin, Tinct., Caffeine Periodide, Calcii Sulphid., Cyperi Rotund, Caps. or Mist., Cimcifuga, Codeina Cough Jelly, Creosote, Dionin, Ether injections, Eucalyptus Oil, Euphorbia, Grindelia, Heroin, Iodoprotein Tabs., Ipecacuanha, Magisal, Morphine preps., Morrhuæ Ol., Piscidia, Potass. Cyanidum, Potass. Iodid., Prunus Virginiana, Pulsatilla, Scilla, Senega, Inf. Polygalæ Compositum, Syrup, Picis cum Codeina, Syrupus Picis Liquidæ, Tar, Terpine Di-iodide, Terebenum purum, Terpin Hydrate, Terpinol, Tolu Balsam, Tylcalsin and Tyllithin. Vaccine of organism present, *e.g.*, Pneumo B. Septus, B. Influenza, etc., preferably autogenous.

Antimony and Opium, Tinct. Camph. Co., and with Ipecacuanha. If much bronchial spasm and tough expectoration give decalcifying agents—Potass or Sod. Cit. Later tonics.

Vapores.—Acid. Carbolic., Acid. Sulphuros, Benzoini. Camphoræ, Creosoti Cyllin, Terebeni, Iodi, Croton Ol. Linim., Iodi Linim., Ethyl Iodide, Guaiacol Nebulæ, *q.v.*, *Oxygen* inhaled.

Bronchial Secretion is increased by:—Alkalis, especially Carbonate and other salts of Ammonium, Antimony Salts, Apomorphine, Benzoin, Camphor Iodine, Ipecacuanha, Jaborandi, Peru Balsam, Quillaia, Senega, Squills Sulphur, Tar, Terebene, Tobacco, Tolu Balsam, Turpentine.—H.W.

Bronchocele. *See* **Goitre.**

Broncho-Pneumonia and capillary bronchitis in infants. Mist. Paraldehyde and Potass. Iodid. Whisky in small doses.

Bruises. *Locally.—Arnicæ Tinct. (well diluted), Calendula, Hamamelis, Hydrastis Tinctura, Lot. Plumbi et Opii, Hazel Foam.*

Bubo. *Locally.—Chlori Aqua, Hydrarg. Oleat., and cum Morphina, Hydrarg. Ung., Hydrogen Peroxid., Mercurome.*

Burns and Scalds. *Locally.—Acid. Boric Ung., Acid. Picric and Wool, Ac. Tannic, Alcohol, Allantoin in dressing, Anserine Mulls medicated, Calamin. Lotion, Chartazine, Chloretone* 10% *Ointment, Cocainæ Ceratum, Cremor Sicc. preps., Fœxin poultice, Glycerin as an application (good), Hyd. et Zinc Cyanid. Ung., Iodised Phenol, Mastiche Benzol, Iodoform, Lanolin, Lini Ol. cum Aqua Calcis, Picric Acid (strongly recommended), Scarlet 'R.,' Sodi Hyphosulph. (moist dressing), Thymol Ung., Vaseline, Zinci Oleat. Ung., Zinci Ung., Hazel Foam, Volckmann's Solution, Zinc Peroxid.*

Thorough antiseptic cleansing of the affected part and thereafter dusting with equal parts of Boric Acid and Bismuth Carbonate (not nitrate).

Burns 'X' Ray, see "Radiology."

In burns of the first degree, wet Picric Acid dressings gave much the best results and in burns of the second degree perfectly satisfactory results. Boric Acid baths gave good results in burns of the second degree and Ichthyol Ointment in burns of the third degree.—L. i./12,110.

Paraffin preparations, *e.g.*, that known as 'No. 7' and the proprietary Ambrine are melted and sprayed on to act as an impervious protective.

Burns (cordite, etc.) in the Jutland battle treated with an oil consisting of Menthol 2 grains, Eucalyptus Oil 3 minims, Carron Oil to the ounce as an occasional application with cotton wool. Sponge the part with saline solution to remove pus.—W. M. Ash and C. P. G. Wakely, L. ii./16,56.

Lanolin best application for burns. 20% Vaseline may be added, followed by weak Permanganate and then Normal Saline.—L. ii./25,1238.

Surprisingly favourable results with Ultra-Violet light.—C. B. Heald. L. i/25,1162.

Dressings soaked in the following solution: Standard Eusol solution 1 part (20%), 10% Saline solution 2 parts (Sodium Chloride 4%), Water 2 parts. Dressings must be thoroughly wet when applied and must be changed frequently.—W. R. Wilson, B.M.J. i./27,55.

Application of several layers of gauze, wrung out in hot Wright's hypertonic saline (5%), (after removal of dead tissue) the best routine treatment for burns.—D. Mackenzie, B.M.J. i./27,421.

Waxed paper or thick tissue in Carbolic Oil advised.—A. Masterman, B.M.J. ii./27, 590.

Acriflavine and Paraffin Wax. Flavine 0·2, Eucalyptus Oil 2, Olive Oil 5, Soft Paraffin 25, Hard Paraffin 67·8.—P.J. ii./27,451.

The toxæmia following serious burns in children is due to acidosis which may be treated by giving dibasic Sodium Phosphate, 20 to 30 grains every 4 hours, in addition Glucose in 5% solution should be given and treatment for shock carried out. Local applications which have been tried are Absolute Alcohol: Picric Acid: a mixture of Aluminium Acetate 2% in Alcohol—10 parts, with a 5% Alcoholic solution of Methylene Blue 1 part: Adrenalin 1 in 10,000; Tannic Acid solution 2.5%, or ointment 5%, in a basis of equal parts of Lanoline and Vaseline; Sodium Bicarbonate 10% and Paraffin No. 7. —'The treatment of burns in children,' Prof. J. Fraser, B.M.J. i./27,1089.

Burns with Liquid Phenol.—The following did well:—Sponge with strong washing Soda (*e.g.*, 1 in about 5)—dilute Sodium Hydrate Solution might be better—cover very thickly with Ung. Acid Boric and Ung. Zinc. *p. æq.*, wrap in lint and bandage.—W. H. M.

Calculi, Biliary.—Alkalis, Ox Bile, Oleic Acid, Sodii Benzoas, Sodii Bicarb., Sodii Glycocholas, Sodii Oleas, Soap, Caps. Sod. Oleat. Co.

Cholic Acid 0·075 Gm. and Hexamine 0·225 Gm., three or four doses daily, suggested for biliary lithiasis.—Y.B.P., '27,271.

Calculi, Urinary.—Ac. Acetic, Dil. Douche, Alkaline Carbonates, Ammon. Benz. and Phosph., Aqua destillata, Calcis Aqua, Mineral Acids (for Phosphatic), Piperazina, Potass. Citras, Sodii Benz. and Hippuras, Sodii. Phos. Acid, Triticum.

Detection of by 'X' Rays, *q.v.* Examination of *vide* Vol. II. The following draught saved a doctor's life.—Tinct. Hyoscy. ½ drachm, Chlorodyne 20 minims, Liquor Potassæ 25 minims, Aq. Camph. ad 1½ ounces. A jagged calculus was passed.—C.D.

Papaverine Sulphate 5 Cc. of 2% Solution given by a catheter has expelled.

Bladder irrigation with 15% Hydrochloric Acid (Caution : very strong !) for calculus. Patient could retain 50 Cc. for ½ hour.—B.M.J.E. ii/21,6.

Cystinuria. The formation of calculi can be controlled to a certain extent by the administration of large doses of Sodium Bicarbonate.—J. F. H. Stallman, L. ii./25,375.

Avoid excess of carbohydrates; give green vegetables and fruits.—W. E. Deeks, Diet and Disease, 1927.

Cancer (for Palliative Treatment).—Alnus Glutinosa, Arsamin, Arsenic preps., Calx. Sulphurata, Chelidonium, Chloral Hydras and Opium preps. (as sedatives), Cinnamic Aldehyde Caps., Condurango, Elixir Antimonii Cinnamicum, Ext. Violæ Liq., Goat Serum, Magnesium Carbonate or Chloride large doses, Neolyse, Plumbi Acet., Sodii Cinnamas, Sodii Oleat.

For Palliative Local Use.—Acetone, Acid. Acetic Glacial, Acid. Arsenious, Acid. Carbolic. (caustic), Acid. Carbolic. Glycerin, Acid. Chromic., Acid. Lactic, Acid. Nitric Fumans, Acid. Sulph. Fumans, Acid. Salicylic. cum Oleo, Benzole Injection, Coley's Fluid, Colloidal Copper, Colloidal Lead, Colloidal Selenium, Cupri Sulph. Pigment, Cupri Oleatis Emplastrum, Ovules and Bougies, Eusol Injected, Fibrocoumarin and Comps., Formalin plugging and injection, Hydrarg. Nit. Acid., Liq. Hydrog. Perox. (in inoperable uterine), Injectio Antimonii, Inj. Bismuth Carb. (see Radiology), Iodic Acid, Iodinol, Iodo-Acetone, Iodoform. Local application of Arsenic (Trunecek), London Paste, Methyl Violet, Morphine, Morphinæ Oleat., Oxygen injected suggested, Quininæ Hydrochloridi Injectio, Liquor Potassii et Sodii Hypochloritum, Magnesium Salts, Neolyse Quininæ Salicylas, Radium, Resorcin, Secondary Radiation from Silver, Sempervivum Tect. Succ., Sodium Orthocoumarate, Sodii Phosphas Acid. with Hydrochloric Acid, Symphytum Cataplasm, Tarax. Ext. Liq., Thoriac Comps., Thymus Gland, Thyroidectomy, Ung. Thorii Oleat., Uranium Salts, *e.g.*, Oxide as Dusting Powder, Tylmarin-Thorium, Ung. Antimonii (?), Vaccine M. Neoformans, Vienna Paste, Viola Odorata, '*X*' Rays, Zinci Chlorid, and Pasta, Zinc Mercury Iontophoresis.

Drage's results and opinions on treatment with Cinnamates, Coumarates, Tylmarin, and Colloidal Copper, *v.* p 26 *et seq.* and 370.

Cupri Glycinas, also Copper Alanin, *q.v.*, have been suggested for trial.

Potassium Chlorate, 10 grains in milk three times daily, and Lead Acetate ¼ grain, three times daily, in cancer of the tongue. A boon to sufferers from cancerous ulceration of the tongue.—B.M.J. ii./26,408.

Cocaine. Cancer sufferers tolerate large doses—diagnostic ?

Basuto negroes in Orange Free State do not suffer from.—B.M.J. i./23,1116.

Pituitary prolongs patient's life in cancer. It cuts off blood supply from the growth.—Per Pres. Jan. '23,13.

Diet free from fat soluble vitamin "A" tried. It was thought that malignant cells in the human body might die on such a diet, and that a malignant mass, though it would certainly not be destroyed, might be so hindered in growth as materially to prolong life and the cachexia produced by it, diminished or prevented. The results gave a loophole of hope.—S. Wyard, L. i./22,840.

The cancer rate is increasing and running parallel with the increased consumption of manufactured foods—largely carbohydrate and deficient in many important elements.—W. E. Deeks, Diet and Disease, 1927.

Prognosis in rectal cancer.—J. P. Lockhart-Mummery, L. ii./26,1307.

Goat Serum (prepared at the Lister Institute) in malignant disease.—Intramuscular injections in ½ ounce amounts produced improvements. It unquestionably attacks the growing outskirts of the tumours. It is known that the goat never suffers from cancer and it is believed that the animal's serum contains some chemical property which can resist cancer. In cancer there is fatty degeneration. This is cleared away by the activity of lipase. The enzyme, Prolipase, which is insoluble and inactive, resides in the tissues, notably in the pancreas. The necessary co-enzyme, which is soluble, is found in the pancreas and serum and activates the enzyme, forming the full Lipase. Shaw Mackenzie found the co-enzyme low in activity in cancer serum but its accelerating power improved if patient improved or recovered ; also goat and sheep serum about 50% more in power than in human serum, that of the goat being 14·5 as against the human average 9. Possible to judge whether a case e cancerous or not by condition of serum. Shaw Mackenzie's test consists n adding Sodium Oleate; saponified and Ether extracts of cancer tissue and f cholin, respectively to the suspected serum in suitable quantities. After ncubation at 37° for some 18 hours, a cloud, or ring, or turbidity appears at he junction of the fluids with carcinoma serum but not with normal and on-cancerous serum—cloud in part due to Cholesterol.—Albert Wilson, Edin. Med. Jl.; May, '25,248. See also *Sodii Oleas*, p. 761.

The death-rate in 1926 was 1362, as compared with 1336 in 1925, 1297 n 1924, and 1267 in 1923. These figures do not indicate an actual rise in ncidence but that important factors in the apparent rise are more accurate iagnosis, improved certification of causes of death, and increased longevity esulting in a greater number of people reaching the age period of cancer than ormerly.—Sir George Newman's Report for 1926, B.M.J. ii./27,499. See lso D. F. Shearer L. i/28,1225.

Lead intravenously at London Cancer Hospital failed to benefit.—S. Wyard, .M.J., i/28,840. Blair Bell criticised latter preparation and procedure.—*id.* 958, 1087. *See also* Dilling *ibid.* 999, *also* 1047.

Colloidal Lead Iodide used with relative impunity.—D. C. L. Fitzwilliams, .M.J., i/28,1047. Colloidal Lead Selenide also found safe—not a cure but opeful.—A. T. Todd, *ibid.*

or Diagnosis, *vide* **Cancer**, Vol. II.

Cancrum Oris.—Arsenicals, ***e.g.***, Galyl intravenously.

Carbolic Burns. See **Burns.** For poisoning, *vide* p. 13 ***et seq***

Carbuncle. Vaccine and serum therapy not advised in acute stage, but nall doses of autogenous vaccine may be useful in chronic stage. When peration inadvisable, locally Magnesium Sulphate and Glycerin Carbolic aste.—H. E. Griffiths, L. i./25,38. See also our pp. 547, 1039.

Cardiac Mitral Stenosis.—Oxygen inhalation. Decalcification of the lood, *vide* p. 257, *Camphor.*

Cardiac Tonics.—Adonis Vernalis, Adrenalin, Caffeina, Camphor, Con-allaria, ***e.g.***, Glyco-gelatin Pastil, Digitalis, Nitroglycerin, Ouabain, Oxy-parteinæ Hydrochlorum, Pituitary (Posterior lobe), Saccharinum, Scilla, parteinæ Sulphas, Strophanthus (Strophanthin, has been used intravenously), rychnina, Thyroid, Thyroid and Manganese, Veratrum Viride.

Drugs acting upon the heart directly :—

The force of contraction may be increased by :—Apocynum, Barium Salts, onvallaria, Digitalis, Erythrophlœum, Physostigmine, Sparteine, Squill, rophanthus, Suprarenal Preps., Veratrum. *Rate of the Cardiac beat is in-creased by* :—Atropine, Caffeine, Cocaine, Hyoscyamine. *Both force and the umber of beats are increased by* :—Alcohol, Anæsthetics, Chloroform, Ether, uinine. *The vagus centre is stimulated by* :—Aconite, Alcohol, Apocynum, tropine, Butyl Chloral, Chloral Hydrate, Chloroform, Cocaine, Convallaria, igitalis, Ether, Hydrastis, Hydrocyanic Acid, Hyoscyamine (early in the action), Nicotine, Picrotoxin, Pituitary Ext. (posterior), Squill Staphisagria)elphinine), Strophanthus, Strychnine, Suprarenal, Veratrine.—H. W.

In acute injuries, such as rupture of the aortic valves in pericarditis, Digi-alis is of little value. In chronic diseases of the myocardium, of syphilitic c., origin, it is of secondary importance, and is often contra-indicated f greatest value in chronic valvular disease and in heart fatigue after acute isease or strain.—Sir R. Douglas Powell, Pr. May, '14,612.

Effect of Digitalis most striking in cases with rheumatic origin. Digitalis only called for when the rapid ventricular rate leads to some symptoms the part of the patient; it is not called for in all cases of weak and rapid rdiac action. The therapeutic benefits of the drug are obtained when the ter manifestations of heart disease have appeared and not in the acute flammatory or actively toxæmic stages.—G. A. Sutherland, L. ii./23,1222.

Auricular Fibrillation.—Digitalis, Quinidine.

Efficiency of the heart and its measurements. The stroke volume and the olume of the circulation is now known, as also range of variation. Volume the blood stream through the lungs is determined from the rate of absorption Ethyl Iodide vapour.—Prof. Y. Henderson, L. ii./25,1317.

Cardiac Depressants.—*Both force and the number of beats are decreased* :—Acetanilide, Aconite, Antimony, Arsenic, Bromides. Chloral Hydrate, metine, Ac. H.C.N., Lobelia, Phenacetin, Phenazone, Pilocarpine, Veratrine. *The vagus may be depressed by*:—Large doses of many of the above drugs and rugs which diminish the blood pressure such as Amyl Nitrite and Cocaine.-H.W.;

Caries.—Calcii Chlorid., Calcii Hypophosph., Calcii Phosph., *Calcium Iodate.*

Caries, Dental.—Calcii Sulphidum (for Pyorrhœa), Pyorrhœa Vaccine. *Locally.—Arsenical Paste, Dental Solubes, Lanolin and Cocaine, Lactic Acid Bacilli, Paramonochlorphenol, Lotio Acidi Citrici et Phenolis, Salol or Formosyl Mouth Wash or Tooth Paste. See also Dentistry, local applications.*

Examination of teeth showed that the relative proportion of organic and inorganic constituents bears no relationship to the degree in which teeth are attacked by dental caries,—decay is due to predisposing and exciting causes.

Cataract, to prevent Senile.—Iodides, Mercurials, (*Hyd. Cyanid.*), Tonics.—Quinine and Iron, Strychnine.

Cataract treated by bathing the eyes with a lotion of Calcium Chloride 4, Sodium Iodide 4, Water 500. The theory is dehydration of the lens.—Br. Jl. Oph., Apl./20,192; Pres., Feb./21,72.

Thyroid treatment with varying results. A definite relationship has been traced between the thyroid gland and cataract.—A. J. Kerr, per Pres., Jan., '27,18 and Feb., '27,59.

Catarrh, Bronchial.—*See* **Bronchitis.**

Catarrh, Gastro-intestinal. *See* **Gastritis.**

Catarrh, Nasal.—Aconite, Ammon. Chlor., Arsenic, Camphor, Cinnam. Ol., Cubebs, Elix. Cal. Chlorid., Glycaphorm, Magisal, Linctus Pini Terp. et Heroin, Mist. Anti-catarrhalis, Pilula Atropinæ Quininæ et Arsenici, Quinina, Tab. Quin. Camph. Morph. et Atrop, Troch. Camph. Salicyl. Co., Tylcalsin, Tyllithin. Combined Cold, Ozœna, and other Vaccines.

Locally.—Adrenalin, Alum Spray, Argent. Collodial, Bismuth Co. Pulv., Borated Hydrog. Perox., Camphor inhalation, Carbolised Smelling Salts, Comp. Asthma Fluid, Dobell's Solution, Ethyl Iodide inhaled, Eucalypti Oleum, Eusol, Guttæ Chlorof. Menthol Co., Liq. Alum. Format., Menthol Inhalation, Injection, Wool and Snuff, Menthol and Camphor Inhalation, Ozonic Inhaler, Peptone Injections, Potass. Permang. as Nasal douche (very dilute) and some retained with plugs, Resorcin as Nebula, Sod. Desoxycholas, Suprarenal Extract Thymaglycin, Ung. Belladonnæ, Ung. Morphinæ cum Acid Tannic, Zinc Ions.

Nothing so efficient as a fine spray of Formalin Solution, ¼ to ½% applied *early.*—Tilley. Formosyl Gargle, diluted is better.—W. H. M.

A warning against the use of nasal lavage—it is quite common for repeated attacks of acute middle-ear inflammation and its complications to result from some of the injected solution passing up the Eustachian tube. The Ministry of Health must accept some responsibility, since they advised lavage as a preventive measure in the influenza epidemics.—A. H. Cheatle, L. ii./25,1141.

The writer has used ***Formosyl Gargle*** to nose and throat at least twice a day for years. One agrees Permanganate, except in *extreme* dilution, is *unsuited.*

In the initial stage of a cold Morphine Sulphate ⅙ grain or Dover Powder 10 grains at bedtime with hot gruel. This usually arrests. If the dry initial stage passed and the nasal fluxion thoroughly established a draught containing Opium, Ipecacuanha, Salicin, Ammonium Acetate and Camphor is useful, or substitute Spirits of Nitrous Ether for the Opium.—Yeo.

Acute nasal sinusitis. Nasal inhalation of mentholised steam for four minutes every hour or two hours. Menthol 10 grains to the ounce of Tinctura Eucalypti or Alcohol (90%) 1 drachm to be added to a jug half full of boiling water. Menthol is not suited to young children. 'Clears the head.' Nose lotions during the acute sinusitis are useless, but when discharge begins freely an alkaline lotion may be snifted or sprayed into the nose.—Sir St. Clair Thomson, Pr., Jan. 1921.

If patient is in the *shivery stage*, Dover's Powder 10 grains. For the *profuse watery discharge stage*, Tinct. Opii 5 minims every 4 hours. For the *sticky discharge stage*, give alkaline mouth-wash. For a *sore throat*, the following has been described as a sovereign remedy: Tincture of Aconite 2 minims, Potassium Chlorate 5 grains, Solution of Perchloride of Iron 20 minims, Solution of Mercuric Chloride 10 minims, Solution of Strychnine 2 minims, Glycerin 1 drachm, Chloroform Water to 1 ounce. The dose to be used as gargle and then swallowed.—C. and D., June 1921.

Recurrent 'colds in the head.' A daily dose of ½ minim Liquor Atropinæ Sulphatis for 10 days is often of value. Removal to a more congenial air will often work marvels.—F. Stoker, Pr., Nov. 21, p. 348.

Common Cold—its natural cure. If fever develops rest in bed is essential.—O. Heath, L. i./22,688.

Catarrh, Uterine.—*Acid. Carbolic. Glycerin., Boracis Glycerin., Camphorated Carbolic Acid, Iodoform Gossyp. and Pessus, Plumbi Subacet. Glycerin. Opii et Amyli Enema, Ung. Adrenalin, Ovules (see List) and Tampons, Zinc. Sulph. Uterine Pencils, and with Alum, Zinc and other Ions.*

Catarrh, Vesical.—See **Cystitis.**

Cathartics.—See **Constipation.**

Caustics.—*Copper Salts, Nitric Acid, Potassa Fusa, Silver Salts, Sodium Ethylate and Methylate (vide Meningitis), Vienna Paste, Zinc Chloride.*

Cerebro-Spinal Fever.—Antimeningo Serum.—Antim. Pot. Tart. intra., Hexamine, Opium, Phenacetin, Phenazonum, Vaccine Treatment. Flexner's Serum. See article in Vaccine Chapter.

Locally.—A counter irritant, e.g., Liq. Iodi or Liq. Epispastic over the cervical spine.

Iodine in Glycerin as swabbing, Zinc Sulphate as steam spray, Permanganate Spray (1 in 1,000).

Meningococcus Carriers.—*Acriflavine, Di-Chloramine T., Flavine Spray.*

Cerebro-spinal Fever.—Lumleian Lecture.—Sir H Rolleston L. i./19,411, 593, 645.

Persistance of Carriers.—D. Embleton & G. H. Steven, L. i./19,788. Determination of type of meningococcus.—A. S. Gordon Bell, L. i./19,887.

Intraventricular injections of serum good.—B.M.J.E. i./24,73.

Class contacts at school should be kept under close medical observation for 2 weeks and home contacts excluded from school for 3 weeks. An infected child will not be able to re-attend school for 3 months after onset of illness.

Chancres, Soft.—Arsenobenzol, Bismuth Benzoate.

Locally.—Hydrarg. Flav. Lotio, Hydrarg. Nig. Lotio, Hydrarg. Subchlor., Hydrog. Perox., Iodic Acid., Iodof. Pulv. and Ung., Liq. Carb. det., Mercurome, Pb. Acet. Lotio, Resorcin.

Chapped Skin.—*Acid. Boric. Ung., Camphor Ball, Ceratum Petrolei, Collodium, Glycerin. cum Aqua Rosæ, Hazel Foam, Cucumeris Ung., Lanolin, Thorii Oleat. Ung., Ung. Phenoboric, Zinc Cream, Zinc Oleate.*

Chicken Pox, *see* **Varicella.**

Chilblains.—Calcii Chloridum, Calcii Iodidum, Calc. Lactas.

Locally.—Acid. Boric. Ung., Acid. Camphoric, Acid. Carb. Ung., Aconit. Linim., Anserin Mulls Medicated, Balsam Locatelli (even if broken), Bellad. Lin., and Linim Co., Lin. Iodi et Bellad., Cajuput Ol., Calamine Lotion (extra strong), Calcis Chlorinat. Ung., Capsici. Linim., Carron Oil, Collodium Iodi., Eucalypti Ol. Ung., Glycerini Plumbi Subacet. Ung., Hazel Foam, Hydrogen Peroxide Solution, Iodine Colloidal, Iodi Tinct. Decolor., Iodi Ung., Iodoform Wool and Ung. Oleanodyne, Pasta Ichthyol et Ol. Tereb., Plumbi. Subacet. Glycerin, Picric Acid Solution, Tamus Communis, Thorii Oleat. Ung., Paraffin No. 9, Tinct. Capsici fort. Vaselinum Zinci Oxidi.

If unbroken the following may do good:—

(1) Immersion of the parts once or twice a day in warm water, with subsequent—(2) Gentle friction with Camphorated Alcohol. (3) Use of a dusting powder,—Bismuth Salicylate 1 in Starch 10. If the sense of burning and pain is not relieved by these means, occlusive dressings with Zinc Ointment or Lassar's Paste, Ichthyolated if required, may be used.

Paramonochlorphenol may be applied as a 2, 5 or 10% solution in glycerin or in alcohol, the weaker solutions being used for the less severe forms. Ointment as follows, equally effective:—Paramonochlorphenol, 1, 2 or 5 parts; Vaseline 50 parts, Lanolin 50 parts.

Calcium Chloride 5 grains and Liq. Calcis Sacch. 1 drachm in milk *t.d.* and Pil. Aloes et Ferri 4 grains once daily. Include eggs in the daily diet.—E. B. Hazleton, B.M.J. i./17,212. Further on Lime Salts, p. 267.

As to Calcium estimations of the total and ionisable Calcium in young girls of the fat acroasphyxial type showed no Calcium deficiency, this corresponds with finding that Calcium Lactate seldom relieves. Thyroid and large doses of Iodine, on the other hand, usually of great value. Give Calcium Parathyroid and Cod Liver Oil in the thin hypotonic scrofulous patient with acroasphyxia.—H. W. Barber, L. ii./26,1180.

Oral use of Iodine in large doses either alone or in combination with thyroid good.—H. W. Barber, L. i./26,311.

Sodium cacodylate injections ¼ grain. Three injections at intervals of about two days good.—W. R. Grove, L. i./26,312.

Calcium Chloride, 10 grains three times daily. The Lactate not so good, and Parathyroid ¼ grain once or twice.—E. A. Milner, B.M.J. ii./26,917.

Obese people are preferably treated with Thyroid and Lugol's solution, whereas thin people do best on Calcium in some form.—J. F. Christie, B.M.J. ii./27,1032.

Chilblains *unbroken*—paint with *Tinct. Capsici and Lin. Camph. Co.* equal parts. For *broken*—*Unguentum Resinæ* ½ *oz., Unguentum Acidi Carbolici* ½ *oz., Zinc Oxide* 2 drachms, Vaseline to 2 ounces.—T. M. Hovell, B.M.J. ii./19,668.

For irritation. Liq. Plumbi Subacet. Fort. 2 dr., Lin. Camph. Ammon. 6 dr., Ol. Sinapis Essent. 2 m. Shake in a bottle. A cream is formed. To be freshly made. Found effectual in our works.

A very strong *Salicylic Collodion* (1 in 8) excellent.—Sir G. A. Reid, Clin. Jl., Dec. 26/23,617.

Chloasma.—*See* **Freckles**.

Chlorosis.—Arsenic, Arsenic and Iron Injection and Drops, Iron Salts, Hypophosphites, Manganese Salts, Marrubin, Myrrh et Aloes Pil., Phosphorus, Santonin, Sirop Neurotonique, Sodii Persulphas, Trilactine.

Diminish fluids in the body by Caffeine, Magnes. Sulph., Zinc Sulph. *cf.*—p. 249

Suppress menstruation by hot injections or Amyl Nitrite.—*Vide* Amyl Nit.

Cholera.—Atropine Injection, Calc. Permang. (with Hypertonic Saline), Camphora, Carbo Animalis, Charbon Naphtolé, Chloromorphiæ Liq., Copper Salts, *e.g.*, Sulphocarb., Coto and Cotoin, Erythrol Nit., Helba, Hydrarg. cum Creta, Hydrarg. Subchlorid. cum Opio, Hydrog. Perox., Hypod. injections of Quinine Hydrochlorosulphate and Carbamide, Kaolin, Magisal, Mannitol Nit., Menthol (for vomiting of), Morphina, Nitroglycerin, Ol. Allii Essent., Opium, Plumbi cum Opio Pil., Resorcin, Salol, Sedeff, Sulphurous Acid, Tinctura Capsici or Cayenne in Brandy in emergency, Tinctura Chloroformi Co., Tribromophenol-Bismuth.

Nitrites. the sheet anchor, following on intravenous injection of hypertonic saline to combat the collapse stage.—G. B. Sarkar.

Tannin rectal injection, Saline Solution rectal injection, Cholera Vaccine, *cf.* Multiple Vaccines, Cholera and Typhoid, also *Tetra*, *Penta* and *Hexavaccines* Glucose, Subcutaneous and Intravenous Injections.

In the *evacuation stage*, Opium is largely used. Some hold it is dangerous. Combined with acids and carminatives it can cut short the disease. Kaolin as intestinal astringent in large doses—an ounce every hour in a glass of water. ***Tomb's Essential Oil*** mixture is successful: Aniseed Oil, Cajuput Oil, Juniper Oil, of each 5 m., Aromatic Sulphuris Acid 15 m., Spirit of Ether 30 m. Of this ½ drachm doses should be given in an ounce of water every ¼ hour for 2 or 3 hours. Doses vomited should be repeated. It is powerfully carminative, stimulant, and astringent, quickly arresting diarrhœa, and it is *safe, e.g.*, to give to unintelligent persons. For *collapse stage*, 3 to 4 pints isotonic Saline, with 60 grains of Sodium Bicarbonate per pint added, intravenously, must be resorted to, the solution being run in at the rate of 2-oz. per minute. Hypertonic Saline (Rogers) has no specific action. Rectal injections of Hyperalkaline Saline (with 120 grains Sodium Bicarbonate) should be given where collapse has been overcome but suppression of urine still persists. The essential oil mixture, one drachm three times a day, during epidemics affords almost absolute protection.—J. W. Tomb, L. ii./26,722.

Tomb's Mixture is undoubtedly an efficient preventive and cure for cholera, and will clear up a case of typhoid fever in 24 hours.—A. Cannon, B.M.J. i./27,98. See also G.O.F. Sealy, B.M.J. i./22,918. The Mixture is in no way intended as a rival to Saline injections, the latter being for the treatment of collapse and the former to prevent it—it is no use after collapse. Characteristic pungency of mixture obviated by giving ½ dr. doses every ¼ hour in ounce of water. Sucking ice after administration minimises tendency to vomiting. —J. W. Tomb, I.M.G., Mar. '26,155.

Cresol 4 minims, Aromatic Sulphuric Acid 5 m., in water 4 oz. (less doses for children). Give every ¼ hour for 8 doses and every ½ hour for a further 4 doses, after which the acid is omitted, and Cresol alone in same dose continued at hourly intervals for another 12 doses, at 2-hourly intervals for another day, and at 3-hourly intervals on the third day.—F. J. Palmer, I.M.G., April, 25,155.

Cholelithiasis.—*See* **Gall Stones.**

Chordee.—Aconite, Belladonna, Bromides, Camphora, Cannabis, Canthar, Tinct. (one minim hourly), Chloral Hydras, Hyoscine, Hyoscyamine, Morphinæ Inj. hypod., Opii Suppos.

Chorea.—Actæa, Adalin, Antimonial preps., Arsenic, all Bromides, Aspirin, Aspriodine, Brometone, Brominol, Cacodylates, Cannabis and Chloral, Calcii Chlorid., Calcii Phosph., Camphor Monobrom., Chloral Hydras, Cimicifuga Ext. Liq., Codeine, Conium and Coninæ Hydrobrom., Ferri Bromid., Ergot, Ferri Phosph., Formates, Hexamine intrav. (of children), Hyd. Perchlor., Gelsemium preps., Iodides, Iodoprotein, Magisal, Mag. Sulph., Morrhuæ Ol., Nitroglycerin Tabellæ, Phosphorus, Physostigma and Physostigmine, Salicylic Acid, Sedasprin, Sodium Salicylate, Strychnine Sirop Neurotonique, Sulphonal, Tylcalsin, Tyllithin, Valerianates, Zinci Bromid., Sulphas and Oxidum.

Cicatricial Tissue.—Cicatricine, Fibrolysin, Injection Thiosinamin et Sod. Salicyl., Ung. Thiosinamin et c. Phenazon, Urea.

Cirrhosis of Liver.—Ammon. Chlorid., Iodides, Acid Nitro-hydrochloric, Calcii Chlorid., Calcii Lactat., Sodium Phosphate.

Senecio Disease.—Cirrhosis caused by seed of *S. ilicifolius*, etc., in grain in S. Africa.—L. ii./20,848. See also A. R. Cushny, *ibid.* 1089.

Climacteric Disorders see Menopause.

Cold, Common.—See **Catarrh, Nasal.**

Colic, Hepatic and **Renal.**—Opium, Morphine, Belladonna (in large doses), Papaverine (Biliary), Amyl Nitrite, Chloroform, or Ether Inhalation.

Colic, Intestinal.—Æther, Benzyl Benzoate, Calcis Aqua (for infants), Cajaput Ol., Camphora, *Cannabis*, Chloroform, Chloromorphiæ Liq., Elixir Gentianæ Acidum, Menth. Pip. Ol., Morphine preps., Opium preps., Tinctura Carminativa, Bromides, Chloral, Hyoscyamus, Peppermint, Ruta, Valerian.

Colitis.—Aperfine, Bismuth Salicylate, Hydrastis, Isphagula, Ixora, Kaolin, Methyl Di-tannin, Methylene Blue, Naphthalene, Naphthalene Tetrachloride, Psyllium, Salicylates, Salol, Thymaglycin, Trilactine, Vaccinum Myrtillus, *B. Coli* and other Vaccines.

Saline and Boric Enemata. Copper Sulphate injection, *Oils*, Thymaglycin. Glucose, Subcutaneous and Intrav. Injection. Zinc and other Ionisation.

Basuto negroes in Orange Free State do not suffer from.—B.M.J. i./23,1116.

Colitis, Mucous.—Bismuth Sod. Salicyl-Salol Pil., Enema Bism. et Sod. Salicyl., Emulsio Paraff. c. Bismuth et c. Pancreatin. Astringents, such as Tannic Acid preparations and Nitrate of Silver, and sedatives, *e.g.*, Bismuth Salts and Petroleum Emulsion, have been widely used. Salol, *B*-naphthol and intestinal antiseptics generally. Colon Lavage, Kaolin, Vaccinium Myrtillus. *Saline Transfusion.*

Charcoal, 2 drachm doses 4 times a day after meals. Motions in a fortnight rendered free from mucus and blood. Used in India to ward off dysentery and diarrhœa.—T. B. Broadway, L. i./18,637.

An essential indication is to secure the emptying and cleanness of the colon. This may be done by intestinal lavage. Bismuth in bulk (2 ounces) given in bread and milk or jelly taken every week or ten days is often of benefit. It seems to act by scouring the colon. Where there is much fermentation an ounce of Wood Charcoal may be mixed with the Bismuth. For clearing the bowel Castor Oil is best.—Lord Dawson of Penn, B.M.J. ii./21,34.

Antidysentery Serum in large doses intravenously miraculous. Sigmoidoscopic examination five days after showed that the innumerable ulcers had vanished. 40, 60, 80, and 100 Cc. on successive days, and then 100 Cc. for a few additional days.—A. F. Hurst, B.M.J. ii./26,990.

Colitis, Ulcerative.—Anti-dysenteric Serum, Bismuth Carb., Calc. Sulphid. Stearettes, Ipecac., Methylene Blue, Potass. Permang., Silver, also Copper and Zinc ionised. Vaccines.

Enema Bismuth. Subgallat., Ol. Morrh. c. Cresot., Emulsio Sulphuris injected through an artificial anus.

Collapse and Fainting.—Adrenalin, intracardiac injection of, Æther inj. hypod., Æther Spt., and Spt. Co., Alcohol, Ammon. Arom. Spt., Ammon. Vapor, Amyl Nitris., Camphor Inject., Capsules Aromat., Ammonia, Curschmann's Solution, Digitalis Tinct. and Inj. Hypod., 20 m., Erythrol Nit. Tabs., Mannitol Nit. Tabs., Nitroglycerin Tabs., Oxygen, Oxygen and Alcohol Regenerative Tablets. For Rectal Feeding, see p. 402.

Comedones.—Fowler's Solution.
Locally.—Ac. Carbolic, Calamine Lotion, Calx Sulphurata, Resorcin, Vaccine Staphylo. See also Acne.

Conjunctivitis. *Locally.—Acid. Boric, Acriflavine, Alumen, Alum Aceto-Tart., Argenti Acetas, Argenti Fluoridum, Argent. Iodid. Recent, Argenti Nitras, Argyrol, Belladonna, Borax, Colloidal Silver and Mercury, Collyrium Adstringens Luteum, Cuprum. Hydrarg. cum Morphina Oleat, Hydrarg. Oxid. Flav. Ung., Hydrogen Peroxide, Resorcin, Zinc. Acetat. vel Sulph. Lotio, Zinc Ions.*

Sodium Bicarbonate in warm 3% solution is the most generally serviceable cleansing solution in treatment of blepharitis.—R. A. Greeves, L. ii./23,997.

Bacteriology of conjunctivitis.—L. ii./21,1418

Conjunctivitis, Diphtheritic. *Locally.—Formaldehyde, Hydrog. Perox., Hydroquinone, Iodol, Quininæ HCl. vel Sulph. Lotio., Resorcin, Methylene Blue.*

Corrosive Sublimate 1 in 8,000 used in treatment of conjunctivitis—eyes washed every 2 hours. Lids painted daily with Silver Nitrate 2%.—N. Cantlie, Jl. Trop. Med., Feb. 1/23,45.

Constipation.

(1) ***Laxatives*** **:**—Agar, Aloes, Aloin, Aperfine, 'Bitter-free Cascara,' Calomel, Cascara (Capsules, Elixir, Jelly, Mistura Laxativa, Pastils), Castor Oil (useful with Glycerin *p. æq.*), Emulsio Paraff. c. Rhamno Frang., Fæxin, Maricol or other Castor Oil Powder, Emblic Myrobalans, Elixir and Syrupus Ficorum, Felamine, Flax Seed, Guaiacum and Sulphur Tablets, 'Hindu Dates,' Hormonal, Isacen, Maltaffin, Maltolivine, Manna, Mist. Cascara Co., Ol. Olivæ, Oleum 'Elliott' Capsules, Ol. Ricini Aromat, Paraffagar, Paraffinum Liq. and Molle, Pavimol, Eff. and Tablets Phenolphthalein and Phenolphthalein Co., Pil. Cascara Co., Pulv. Glycyrrhizæ Co., Rhamnus Frangula, Rhubarb preps. of, Senna (Elixir, Conf.), Sodii Hyposulphis, Sulphuris Conf., Tamar Indien, Tinctura Laxativa, Trilactine Tabs., or Milk.

Tab. Phenolphthalein with Hyd.c. Creta *aa.* 2 gr. is a useful combination.

(2) (*a*) ***Secretion Stimulants***—Ammonium Chloride, Aqua Aperiens, Jalap and preps., Magnesium Chloride and Citrate, Marienbad Salt Tablets, Normal Saline (1 pint) *mane sum.* Saline Aperient Waters, Seidlitz Pdrs., Sodii Chlorid., Sodio-Magnes. Sulph. Eff., Sodii Phosph. Eff., Sodii Sulph. Eff. (*b*) ***Hepatic Stimulants.***—Aloes, Colocynth and preps., Ipecacuanha, Iridin, Jalap, Mist. Hepatica, Podophyllin, Rhubarb, Sodii Glycocholas, Sodii Sulph., Taraxacum Cocoa, Elixir Gentianæ Acidum. (*c*) ***Cholagogues***—Blue Pill, Calomel, Fel Bovinum, Euonymin (action thought to be simply by relieving the intestine), Grey Powder, Leptandra, Magnesium Chloride, Ol. Menth, Pip., Pilulæ Laxantes, Scammony (Pil. Conf.), Stillingia, Taraxacum preps.

It has long been assumed that the majority of vegetable purgatives stimulate the liver and increase the secretion of bile—this is now known to be untrue in the majority of cases. Bile is the surest and most powerful cholagogue, but Turpentine, Sodium Benzoate, Sodium Salicylate, Euonymin, and Podophylloresin, possess a moderate effect.—Dixon.

(3) ***Peristalsis, Excitants of***—Choline HCl, Ignatia, Nux Vomica, Senna, Strychnine, Pil. Bellad. Nucis Vom. et Cannabis.

(4) ***Spasm Relievers.***—Asafœtida, Belladonna, Bromides, Chloral, Hyoscyamus preps., Peppermint, Valerian.

(5) ***Nerve Tonics***—Arsenical preps., Caffeine, Sodii Glycerophosphas, Zinc Valerianas.

Pil. Hydrarg. Subch., Rhei, Cascara, et Capsicin would have combined effect.

Constipation may exist with a daily opening of the bowels. Delay in passage of the intestinal contents over the normal 40 hours can easily be shown by giving charcoal biscuits to colour the fæces.

Pituitary Extract has been used to counteract intestinal toxæmia.

Enemata (*vide* p. 402), and *Trilactine, Injection and Suppositories. Fel Bovinum Gauze Tampons coated with Soap are used.*

Hypodermic Purgatives.—Aloin, Apocodeine, Colocynthin, Hormonal, Physostigmine.

Intestinal Paresis.—*Enema Ammoniæ.*

Intestinal stasis.—Sir W. Arbuthnot Lane, L. ii./25,1209.

Contraceptives, see p. 729.

Convulsions.—Amyl Nitris, Anæsthetics, Bromalin, Camphor Monorom., Chloral, Chloral and Morphine combined, Chloroform, Conium, Morhine preps., Moschus, Podophyllin, Potass. Acetas, Potassii Bromid., Rue, nema of—(or infantile), Urea-Bromine, Santonin, Sodii Bromid., Sodii itris, Syr. Pilocarpin et Potass. Brom.

Chloral Suppositories.

Types of convulsive seizures in very young infants. Amongst others diopathic convulsions' are dealt with. Chloral is successful, 1 grain every hours to begin with.—J. Thomson, B.M.J. ii./21,679.

Convulsions, Puerperal.—*See* **Eclampsia.**

Cornea, Inflammation, and Ulcers of. *Locally.—Argent. Iodid. Rec., tropine, Belladonna, Boric Acid Lotion, Cocain. Hydroch. Liquor, Duboisine, serine, Fluorescein (diagnostic), Iodine Tincture (Cocaine before and after ainted on), Scarlet R. and Atropine in Castor Oil, Hydrarg. Oxid. Flav. Ung., ydrarg. Subchlorid. Infusum Abri, Pilocarpine and Quinine Lotion.*

Dionine 5% useful, see p. 565. Hyd. Oxycy. Injections, see p. 461. Phenol amph. applied with match, see p. 15. Mag. Sulph. up to saturated solution, ee p. 547.

Corneal ulcer well treated with an ointment containing Atropine and Yellow ercuric Oxide of each 1%.—P. G. Doyne, L. ii./27,132.

Corns. *Locally.—Acetic Acid (Glacial), Carbolic Acid, Collodium Callosum, upri Oleas, Fowler's Solution of Arsenic, Papaw, Formalin, Lin. Iodi., Ung. odi Intinctum, Iodum Oleatum Salicylic Ions, Thorii Oleat. Ung.*

Corns Soft. *Locally.—Durine, Perfumed Formosyls, Silver Nitrate Soluon 1 in 3 applied every 4 or 5 days.*

Coryza.—*See* **Catarrh, Nasal,** and **Hay Fever.**

Cough.—Acid Hydrobromic, Acid. Hydrocyanic, Belladonna, Camphor nd Creosote inhaled, Camph. Co. Tinct., Chloral Hydras, Codeina and Peridide, Conium, Cynoglossum, Elixir Pectorale, Elix. Pini Terpin et Diacetyl orph., Gee's Linctus, Gelsemium, Glycaphorm, Glykeron, Guttæ Rosæ, yoscyamus, Lichenoids, Linctus Camphor. Comp., Linctus Expectorans Antimonii), Linct. Menthol, Linct. Morph. Comp., Linct. Morph. Hydroyanicus, Linctus Terp. Heroin Co., Linct. Thymi et Diaphorm., Pastilli ectorales, Ozonic Inhalers, Liq. Pectoralis, Marrubium, Mist. Apomorph. Co., ist. Tussi Rub., Morphinæ Linctus, Morphinæ Troch., Morphinæ et Ipecac. roch., Opium preps., Pastilli varii, *q.v.*, Picis Liq., Pil., Prunus Virginiana, ami Syrup, Sandal Wood Oil, Spirit of Chloroform, Syrup Coccillanæ Comp., yr. Ferri Iodid., Syrup. Pini Pumilionis, Syr. Thymi c. Diaphorm, Symhytum Infusion, Tab. Formalin to suck, Tabellæ Glycyrrhizæ, Terpin Hydate, Terebenum, Terpinol, Troch. Tussis, Tinct. Benzoin Co., Tylcalsin, yllithin, Vapor Creosot. Co. (Phthisical cough).

Cretinism.—Thyroid Preparations (preferably standardised Liquor or ablets). 'Three Gland' and 'Four Gland' Elixir and Tablets. Suprarenal land.

Cystitis.—Acid Camphoricum, Acid Lactic, Aconite, Alkalis, Ammonium enzoate, Betol, Belladonna, Benzoates, Boric Acid, Buchu, Collinsonia Canalensis, Copaiba, Cystazol, Eucalyptus Globulus, Gokhru, Hexamethyleneetramine and comps., Hydrastis, Juniper, Kava Kava, Liquor Potassæ, Magnesii Boro-Citras, Pareira, Pichi, Salol, Sod. Salicyl, Sorghum, Triticum repens, Uva Ursi, Vesalvine 'B' and Vesalvine 'S' B. Coli or appropriate Vaccine.

Locally.—Argenti Fluoridum, Iodidum and Nitras, B. Ac. Lactic, Irrigation, Cocaine Lactate, Colloidal Mercury and Silver, Creolin Solution, Iodine Douche, Formosyl, Mercurome, Quinine Bisulphate 1 *in* 2,000, *Salicylic Ions, Zinc Sulphanilas.*

Cystitis—its Causes and Treatment:—Internal medication in cases of *mild B. Coli injections* in cases of incontinuence or involuntary nocturnal micturition n children and the cystitis commonly occurring during and after pregnancy usually successful if taken in hand early. Drinks containing Acetate and Citrate of Potash: Conf. Senna and Conf. Sulphuris *p. æq.* Phenacetin and Ext. Hyoscyamus in 5 grain doses, and if pain very acute and vesical tenesmus present a rectal injection of 2 drachms of Starch containing Antipyrin and Laudanum may be given. Urinary antiseptics as the inflammation declines.

Locally.—Dilute Boric Acid Solution is useful if thoroughly done. In chronic cases Silver Nitrate 1 to 2 grains per ounce carefully instilled (in a child 3 ounces may be used and left in the bladder). When the vesical end of the mucous membrane of the canal becomes involved the passage to be swabbed out with Liq. Phenol through a speculum and immediately washed with Sodium Bicarbonate Solution to check action of the Phenol.

Acute Cystitis.—Phenacetin and Ext. Hyoscyami 5 grains each *t.d.*, Appropriate Vaccine. Local Treatment.—Instillations, irrigations with Permanganate 1 in 2,000, Protargol, etc.

Chronic Cystitis.—Internally Boric Acid, ditto with Sodium Benzoate, Antiseptic irrigation. Full directions are given for the latter by syphoning.—L. i./12,570.

Many failures are recorded with Hexamine.

Cystitis, chronic.—Ammonium Benzoate, Buchu, Cinnamates, Grindelia, Hexyl-Resorcin, Juniper, Pareira, Salol, Sandal Wood, Santalol (Caps. and Tabs.).

Locally.—Eusol, Hydrogen Perox. (5 *to* 10 *Vol.*), *Mercurome, Quinine. See also above.*

Croup, False.– *See* **Laryngismus Stridulus.**

Cystinuria *see* **Calculi.**

Dandruff, *see* **Seborrhœa.**

Deafness.—Pilocarpine, Uranium, *e.g.*, **Autunite Irradiation,** *q.v.* See *also* Earache.

In old people, Thyroid Siccum ½ gr. twice daily.

Debility.—Acidin, Alcohol, Aperfine, Arsenic preps., Bismuth and Pancreatin, Bone Marrow Extract, Bovril, Calcii Hypophosph. Syrup, Calcii Phosph., Calc. Glyceroph. c. Lacte Exsicc., Capsulæ Valerianat, Catha Milk and Glycerophosphates, Cinchona preparations, Conf. Glyceroph. Co., Elixir Ferro-Manganes. Pept., Elixir Gentianæ Acidum, Elix. Hæmoglobin c. Lecithin, Emuls. Ol. Morrh. c. Lecithin, Eupatorium, Ferrocarnis, Formates (Inorganic and Quinine), Glycerophosphates, Glycerole of Hypophosphites, Hæmoglobin Capsules and other preps., Herogen, Hypophosphites, Iron Salts, Kolentos, Lecithin Pulvis, Liq. Pepsinæ et Caffeinæ, Maltum, Malted Glycerophosphates, Maltolivin, Marrubin, Malt Ext. c. Hæmoglobin, c. Pancreatin, c. Hypophosph., &c., Malt Ext. cum Syr. Ferri Phosph., Morruhæ Ol., Phosphorus, Pil. Potentin Co., Pil. Lecithin c. Ferri Iodid., Pulv. Glycerophosph. Co., Quassia, Quinine preps., Sirop Neurotonique, Sodium Cacodylate, Strychnine salts, *e.g.*, Cacodylate and Formate, Syrup Ferri Phosphat. cum Quinina et Strychnina, Syr. Formatum Comp., Syr. Kolæ Comp., Syrupus Glycerophosphatum cum Formatibus, Helba, Tylmarin, Trilactine. See also **Anæmia.**

For overwork : 2 minims of Tinct. Digitalis thrice daily for lengthy period. —'D.M.' in M.P.C., Oct., '26,1927.

Delirium Tremens (and *see* **Alcoholism**).—Ammon. Carb., Apomorphina, Bromides, Camphora Monobromata, Capsicum, Chloral, Colloidal Gold, Digitalis, Elix. Quinidine, Hyoscine, Hyoscyamine, Opium preps., Paraldehyde a safe hypnotic, Phosphorus, Quinine preps., Sod. Brom. Intrathecal injection, Sodium Chloride Injections, Strychnine, Sulphonal, Urea-Bromine, Valerianates.

Hyoscine, Sulphonal and Veronal in delirium tremens. Notes on each. —R. Eager, B.M.J. i./20,114.

Dementia Præcox—treatment.—T. Beaton, L. i./25,1145,1197.

Dengue Fever.—Sodium Salicylate, Salicin, Potassium Iodide, Phenacetin and Caffeine.

Dengue and malaria. Dengue only occurs where malaria is endemic—a modified form of. Ten cases cited in which attack of dengue apparently gave immunity to malaria. Suggested that dengue antitoxin should be employed as prophylactic against malaria.—R. E. I. Johnson, Jl. Trop. Med., Jan. 15, 23,27-28; May 1/22,111,112.

Dentistry. *Locally.—Alcohol Sandarachi, Borated Hydrogen Peroxide Butyn, Cinnamon Paste, Cocaine Lanolin, Cocaine-Menthol-Phenol, Collutorium Alkalinum Astringens, Formalin, and with Creolin, Copal Solution, Dental Anæsthetic, Dental Compo, Dental Rubber, Dental Wax, Emplastrum Capsici, Eucaine Lactate, Erythrophleine, Gossypium Arseniosum, Hydrogen Peroxide, Iodoform Paste, Formosyl Mouth Wash, Tooth Paste, and Dental Dressing, Mercury Amalgam, Pasta Arsenicalis, Zinc Oxychloride, Zinc Oxyphosphate, Zinc Oxysulphate.*

For use after anæsthetics.—Amyl Nitrite. ***Vide*** **also Chloroform, &c.**

Derbyshire Neck.—*See* Goitre.

Dercum's Disease.—Thyroid *(q.v.)*.

Dermatitis. *Locally.—Liq. Alum. Acet., Acid Boric Lotion, Anserine Mulls Medicated, Manganese Butyrate, Paraffin No. 7, Perfumed Formosyls, Pot. Permang., Ung. Ac. Salicyl* 50%, *Ung. Rusci Co., Carbolised Zinc Ointment.*

Industrial dermatitis—bakers' itch, sugar itch, water rashes. Formalin **dermatitis. from cutting oils, in engineering factories, Tar, etc.—Hall Stewart,** B.M.J. i./22,498.

Dermatitis exfoliativa neonatorum, pemphigus neonatorum (Ritter's Disease). A fatal case.—R. McDonald Cairns, B.M.J. i./23,186.

Dermatitis venenata. More than 40 species of plants in the Antilles produce skin reactions, either by the latex of the plants or by their appendages, generally the hairs—due in some cases to the existence of an irritating acid oil. —C. Pardo-Bastello, per Jl. Trop. Med., June 1/23,202.

Arsenical dermatitis—Contramine, Sodium Thiosulphate locally.

Strong soaps and permanent hair-waving bad.—R. Labouraud, L.i./23,1318.

On investigation, many so-called eczemas in women will be found to be cases of dermatitis venenata due to cosmetics containing aniline dyes. Attempted removal of wrinkles by application of Phenol may cause considerable facial deformity and even death.—per Jl. Trop. Med., Sept. 1, '25,322.

Bakers' dermatitis.—All minor cracks, abrasions, etc., should be reported at once and treated with Iodine or Silver Nitrate. Metchnikoff's Ointment (Mercury Subchloride 33% in Anhydrous Lanolin) is the most satisfactory, applied freely, rubbed in, and covered to exclude air. Evacuation of the vesicles greatly hastens healing. All cracks are painted with Silver Nitrate, 15 grains to the ounce of Spirit of Nitrous Ether, before applying ointment. —N. Howard Mummery, L. ii./25,647.

Lime dermatitis.—Preventive measures consist of frequent changes of dust-laden underclothing, alteration of employment, and nightly application of emollient grease to skin of face, hands, and arms. Over-sweating or abnormal dryness are predisposing factors.—W. J. O'Donovan, L. i./25,599.

Dermatitis among painters.—It has been found that paint solvents can cause the irritating vesicular eczema, Turpentine, Thinner and Naphtha being the chief deliquents.—J. A. Turner, per L. ii./25,1033.

Dermatitis produced by Chromium compounds—as used in industries such as tanneries, painting, wool, cotton, 'aniline-black' dyeing, and manufacture of Swedish safety matches and coloured glass, also in Carbon process in photography.—B.M.J.E. ii./25,51.

Sticking Plaster dermatitis.—About 1% of persons have an idiosyncrasy, the offending substance, causing erythema and eczema, being apparently Dammar Resin.—L. ii./25,766,841.

Metol dermatitis.—See p. 308.

Dermatitis due to dyed fur.—In most cases due to presence of a partially oxidised derivative of para-or meta-phenylenediamine, due to imperfect cleansing after dyeing. Some patients wear the furs for a considerable period —6 to 10 weeks—before rash appears, probably due to a gradual development of a sensitiveness to the irritant. Patients advised to get rid of the fur and use Zinc Oxide paste or cream locally.—A. C. Roxburgh, Pr., May, '25, per P.J. i./25,590. See also Paraphenylenediamine, p. 307.

Skin eruptions caused by drugs.—Y.B.P., '24,322,341.

Dermatitis 'X Ray' *(Local use)* Boric Acid Ointment, Radium, Mesothorium Bromide. See also Eczema, Psoriasis, etc.

Keratosis accompanying.—Carbonic Snow.

Dhobie's Itch.—Manson says produced by *Microsporon minutissimum* and are really inflamed erythrasma and not trichophyton ringworm.

Vleminckx's Solution usually cures—used at first diluted three or four times if parts are inflamed.

Dhobie itch of hands and feet, often desperately resistant. After a bath all flaps of frayed horny layer to be trimmed away and the roofs of any vesicles removed. Rub areas of infection with a swab saturated with a 10% solution of Chrysarobin in equal parts of Acetone and Methylated Spirit. In the evening wash off with soap and water and use a 5% Benzoic Acid and 3% Salicylic Acid Ointment. Next day reapply the Chrysarobin.—A. Whitfield, L. i./23,1125.

Unguentum Resorcin et Ac. Salicyl (Castellani) is popular.

Dhobie's Itch Ointment (Deeks) of value for treatment of itch and pruritus ani. Composition as follows : Salicylic Acid 20 gr., Mercury Ammonium 20 gr., Bismuth Subnitrate 1 dr., Eucalyptus Oil 1 dr., Adeps Lanæ (Anhydrous to 1 ounce. Mercury Salicylate which was substituted at a later date for Mercury Ammonium was found not to give such good results.—W. E. Deeks, U.F.C., '25,256.

Relapses with the Itch Ointment prevented by application of powder consisting of 1 tablespoonful Sodium Bicarbonate in 8 oz. Talcum powder.—R. C. Connor, Int. Conf. Int. Am., '24,498.

Diabetes Insipidus.—Arsenic, Adrenalin, Belladonna, Ergot, Gallic Acid, Lithium Salts, Lithion, Opium, Pituitary Injection.

Diabetes Mellitus.—Determine the type of Glycosuria by blood test. Acid Lactic, Alkalis, Arsenic Brom., Aspirin, Arsenobenzol Suppos. and Novarsenobenzol intravenously, Cacodylates, Calcii Iodid., Codeina, Codeinæ Pill Co., Cremor Magnesiæ, Creosotum, Fæxin Ext., Duodenal Extract, Gluten, Gold Salts, Glycerin, Glycerophosphates, Guaiaci Resina, Hexamine, Hyd. Perox., Insulin, Iron Salts, Lævulose, Lecithin Elixir and Emulsion, Magnes. Perox., Milk and Glycerophosph., Morphina, Nuclein, Opium, Oxygen, Ozonic Ether, Pancreatin, Phosphorus, Pil. Codein. Valerian Co., Potassium Chlorate, Saccharine, Elixir and Tabellæ of, Salol, Santonin, Sedeff, Sod. Arsenias, Sod. Chlor. intrav., Sod. Citras, Sod. Lactas, Sod. Phosph., Sod. Salicylas, Suprarenal gland, Taka-Diastase, Thymol, Thymus and Thyroid gland, Trilactine, Trypsin, Vinca major, Yeast.

Diabetic Foods, see p. 591. Dietetic Treatment, see acidosis, Vol. II.

Glucose per rectum especially where acidosis threatens. Pituitary Extract. *Lactose (q.v.)* is stated to be assimilated by diabetics.

Allen's Dietetic Treatment.

The treatment consists of regulated fasting and gradual dieting—metabolic processes are given chance of recovery. In dieting it is now understood the proteins and fats might be deleterious as well as the carbohydrates.—Sir. A. Garrod, B.M.J. ii./21,706. *See also* P. J. Cammidge, B.M.J. i./17,503; O. Leyton, B.M.J. i./17,252; and Modern Views discussed.—E. P. Poulton, L. i./18,863,895; ii./18,31, and H. J. Starling, Clin. Jl. Aug. '23,365.

Of 143 cases treated by fasting 52 died.—P. J. Cammidge, B.M.J. ii./21,708.

A lecture on Diabetes at N.E. London Post Graduate College. Appears to be increasing in prevalence. In 1919 the deaths considerably exceeded those from such common diseases as appendicitis, enteric and cirrhosis of the liver *Race.*—It is said to be commoner among the Hebrew race. The milder form is certainly commoner but not the severe type. Drugs not needed except when there is a marked tendency to acidosis in which Sodium Lactate and Citrate may be given in 40 grain doses of each, thrice daily.—Sir W. Willcox, Pr., Nov. 1921, p. 305.

Ætiology and Treatment.—P. J. Cammidge, Pr., June 22/396.

Antipyrine best used with Hexamine.—Maurice Loeper, per Pr., Sept. '23,235.

Negligible glycosuria.—O. Leyton, Pr., Jan. 1922, p. 113.

Glycosuria of malarial origin. A case with 0·85% Glucose cleared up on treatment with Quinine. Another case starting with 2% Glucose was evidently chronic malaria though parasites were not found. Strict diet. Finally under intensive Quinine treatment with ordinary diet the sugar disappeared.—A. Castellani and J. Graham Willmore, B.M.J. ii./21,286. See also G. A. Harrison, *ibid.* 630.

A diet of 900 calories, mostly fat, produces the same fall in B.M.R. as fasting—less dangerous and more successful in desugarization.—L. H. Newburgh and P. L. Marsh, per Jl. Trop. Med., June 15/23,224.

Casein and Cream every 2 hours in small quantities in diabetes with satisfactory results. The results are often very prompt.—R. T. Williamson, B.M.J. i./15,456. Importance of regulating the fat-intake.—P. J. Cammidge, B.M.J i./18,393.

Amino-Acids Content, Significance of. *Vide* Amino Acids, Vol. II.

The use of Glycerol as a substitute for sugar in the dietary of diabetic patients is of dubious propriety, as there is considerable evidence that Glycerol can give rise to sugar in metabolism.—Jl. A.M.A. ii./25,829.

Stated to be of use in many cases.—W. S. McCann, *ibid.* 922.

Early diagnosis of diabetes mellitus.—per Pr., Feb., '26,169.

Restrict diet to animal proteins, leafy green vegetables and selected fresh fruits. Much more Insulin is given than necessary.—W. E. Deeks, Diet and Disease, 1927.

Van den Bergh Reaction.—In diabetes mellitus. In 130 patients liver injury as absent in only 34. Routine performance of the test may assist in prevention of diabetes.—Brit. Jl. Exp. Path., June, '26,155, per Pres., Jan., '27,13.

Coma of :—*See also* **Insulin.**

Diabetic coma in patients under Insulin.—W. T. Collier, L. ii./24, 575.

Alkaline drinks freely as routine treatment, also Sodium Carbonate (not icarbonate) 40 Gm. per litre intravenously if coma sets in.—Prevention and eatment of.—P. J. Cammidge, L. i./19,60.

Purging treatment by natural aperient water, followed by drinking water or in drinks—said to restore to health and remove all symptoms.—L. i./09,202.

Exceedingly large doses, *e.g.*, 500 Gm. of 5% Sodium Bicarbonate intraenously are given, also Sodium Bicarbonate 40 Gm., Levulose 30 Gm. in ater, 1,000 Cc. by drop enema.

Langdon Brown's Mixture for control of acidosis: Sodium Bicarbonate 1 rachm, Potassium Citrate 30 grains, Calcium Lactate 5 grains, Magnesium arbonate 5 grains, Chloroform Water to 1 ounce.

Blood transfusion (250 Cc. of unmodified blood) in conjunction with large oses of Insulin may prove valuable.—per Pres., May, '26,212.

Two distinct types recognised : (1) ordinary cases with acidosis, recoverable a rule with Insulin treatment, and (2) cases with anuria and little or no idosis, where death occurs in spite of energetic treatment.—A. C. Begg, . ii./25,69. See also *ibid.* 251.

For the thirst of :—Pastillus Acidi Citrici c. Limone.

Diaphoretics.—

Acting peripherally :—Nicotine, Pilocarpine. *Warmth* (local application) nd Alcohol (internally) perhaps act in the same way in addition to their ascular action. *Acting centrally* :—Ammonium Acetate, Ammonium Citrate, ntimony Salts, Ipecacuanha, Opium. *Mode of Action doubtful* :—Potassium cetate, Potassium Citrate,—*and feeble* :—Aconite, Colchicum, Lobelia and alicin. *Anhidrotics* or *Antihidrotics*,—Acting peripherally,—Atropine by cting on the ends of the nerves in the glands, Agaricin, Hyoscyamine, Straonium. Cold (local application). *Mode of action doubtful.*—Acids, Nux omica, Picrotoxin, Quinine, Zinc Salts.—H W.

Diarrhœa.—Acid. Camphoric., Acid. Carbolic., Acid. Gallic, Acid. Hydrohloric Dil., Acid. Lactic., Acid. Sulph. Dil. and Aromat., Agaricus albus and garicin, Albumen Water, Anthemidis Tinct., Benzonaphthol, Benzyl Benoate, Bisciniod, Bismuthi et Cerii Salicylas, Bismuthi Salicylas, Tannas and ther preps., Cajuput Oil, Calcii Carb., Calcii Salicylas, Calcis Aqua, Camhora, Catechu, Catha Milk and Glyceroph., Cinnamon, Cloves, Conradi's rops, Coto, Cotoin, Cretæ Arom. Pulv., and cum Opio, Cupri Sulph., Cyllin yrup, Eucalyptus Gum, Liq. Ferri Pernitratis, Ferri Salicylas, Fortoin, uaiacol Carb., Hæmotoxylin, Hydrarg. Perchlor. in small doses, Hyd. Subhlor. (large doses, *q.v.*), Ipecacuanha, Ixora, Kaolin, Mist. Antiseptica Mistura iarrhœa (Board of Health), Naphthalin, Naphthol, Opium preps., Plumbi cet., Pulv. Ipecac. Co., Pulv. Kino Co., Quin. Salicylas, Resorcin, Roseberry's lixture, Ricini Ol. and Aromaticum, Sedeff, Salacetol, Salicylic Milk, Sassafras. odii Phosphas, Sod. Salicyl., Syr. Ægle Marm. Co., Thieleman's Mixture, ribromophenol-Bismuth, Sodii Sulphas, Trilactine Tablets or Milk, Tylcalsin, yllithin, Vin. Coto-Pepsin, Whey Powder, Zinc Sulpho-carbolate.

Acid, Tannic, Suppos., et cum Opio, Amyli Enema, et cum Opio, Gallæ Suppis. cum Opio, Tannin rectal injection. Turpentine Suppos. See also Dysentery.

Diarrhœa Infantile

Saline injections given either by the skin or bowel are of great and saving alue in acute summer diarrhœa in children.—W. J. Tyson, Clin. Jl., Aug. 9/23,417.

Calomel in large doses has been advised.

Diarrhœa of Phthisis.—Coto and drugs as for diarrhœa, *q.v.* **Kaolin.**

Bismuth Carbonate in one large dose, *e.g.*, 4 drachms to 2 ounces in milk. t cannot be repeated for 3 days.—H. de Carle Woodcock, L. ii./25,674. *See lso ibid.* 727,781.

Calcium Chloride, ½-1 grain intramuscularly or intravenously at intervals f 2 or 3 days beneficial, especially in conjunction with Bismuth Carbonate y the mouth, say 1-2 drachms thrice daily. Injections should be continued or 2 or 3 weeks.—F. Savy, L. ii./25,781. *See also ibid.* 674.

A. F. Hurst recommends Dilute Hydrochloric Acid 30 to 60 minims with each eal.—*ibid.* 727.

Diphtheria—Acid. Salicylic., Aconite, Antitoxin, Calcii Sulphid., Ferri Perchlorid., *Hydrogen Peroxide*, Kaolin, 'Petroleum Oil' (Kerosene), Sodii Benzoas, Sodii Chloras, Sodii Hyposulphis, Strychnine preps. for paralysis when a sequela, Toxin-Antitoxin Mixture as prophylactic, Tribromophenol. Normal Saline (in grave toxæmic states

Locally.—Acid. Benzoic. Nebula, Acid. Carbolic. Glycerin. and Nebula, Acid. Lactic Nebula, Acid. Sulphuros. Nebula, Argent. Nit. Swab (v. infra.), Chlori Gargarisma, Colloidal Silver, Mercury, Copper Ionisation (chronic diphtheria of the ear), Formalin Spray, Hydrogen Peroxide, Iodic Acid, Iodised Phenol (Pigment, Gargle and Inhalation), Iodol Pigment, Loeffler's Pigment, Menthol Pigment, Naphthol cum Camphora, Nebula Acid Malic, Ozonic Ether, Papain, Resorcin, Sodii Benzoatis Nebula, Sodii Chlorinat. Liquor, Toluol.

Spraying the throat with Hydrarg. Perchlor. Solution 1 in 1,000 has saved life.

For sustaining blood pressure Adrenalin 2 to 3 minims hypod. every 6 to 8 hours is useful. *See also* Adrenalin.

Aspirin, Phenacetin and Dover's Powder. Combined Tablets are made.

Painting the throat with 12½% Silver Nitrate after the disease stated to sterilise.

A serum has been made (Arloing, Lyons) by injecting into the horse the diphtheria toxin and the bacilli together. Tablets for *internal use* or an *insufflation* of this *dried serum* mixed with tragacanth and an inert powder are effective.—K. L. bacilli found to disappear from the throat.—Pr. Feb. 1920

Case Incidence. Report for '26. *See* B.M.J. ii/27,458.

Diphtheritic Infections of the Skin.—Zinc Ions.

Dipsomania.—*See* **Alcoholism.**

Disinfectants.—See Chapter on

Disseminated Sclerosis. See **Sclerosis Disseminated.**

Diuretics.—*See* **Dropsy, Renal.** *See also* Ammon. Acet., Cantharides, Digitalis, Novasurol, Pil. Hydrarg., Theobrom. Sod. Sal.

Dropsy, Cardiac.—Adonidin, Apocynum preps., Asparagin, Baillie's Pill) Convallaria, Digitalis, Elaterium. Erythrophlœum, Pituitary (Entire gland. Strophanthus, Theobromine Aceto-Salicyl, Theophylline. Pil. Hydrarg, (avoid if renal disease present).

Sodium Chloride-free diet.

Dropsy, Hepatic.—Ammon. Benzoas, Ammon. Chlorid., **Hydrarg. Subchlorid.**, Ol. Juniperi, Sodii Bicarb., Sparteinæ Sulphas.

Dropsy, Renal.—Ammon. Acet., Cit., Tart., Apocynum, Bismuth Carb., Buchu, Caffeina, Cantharides Tinct., Elaterium, Hydrarg Pil., Iodo-Caffeine, Coramine, Ephedrine, Iodo-Theobromine, Jalapa, Pilocarpine, Pineal Body Extract (?), Potass. Acet., Potass. Tart. Acida, Potass. Iodid., Potass. Nit., Quinine, Scilla, Scoparius, Sodii Iodid., Theobromine-Aceto-Salicyl and Sodium Format. and Salicyl, Theophylline, Urea, Urea-Bromine, Vinum Diureticum. Pot. Permang. Injection.—*See* Uræmia.

Dupuytren's Contraction.—Chlorine ions from Sodium Chloride, Fibrolysin, Injectio Thiosinanamin et Antipyrin (see also Sir J. Barr, under Calcii Chlorid). Thyroid Gland and Three and Four Gland Tablets.

5% Salicylic Acid Ointment found effectual in several weeks. Recent works call Dupuytren's contraction a fibrositis.—D. A. Alexander, B.M.J. i./23,794.

Dysentery.—Determine cause.

Alum Inject., Antidysenteric Sera, Argenti Nitras (Rectal Injection), Belæ Fructus, Benzyl Benzoate, Bismuthi et Cerii Salicylas, Bisciniod, Bismuth Tart. Solubile, Calcii Salicylas, Calotropis, Cannabis, Cassia Beareana, Calomel, &c. (the evacuant method), Crocq's Pill, Cupri Sulphocarb., Cynoglossum, Dec. Simaruba et Punic. Granat., Elix. Agrimon. Co., Emetine Bismuth Iodide, Emetine Injections, Emetine Periodide, Eucalypti Gum, Fæxin, Guarana, Hæmatoxylon, Hamamelis, Helba, Hydrarg. Perchlorid., Hyd. Subchlor. (large doses), Hydrog. Perox., well diluted as enema, Hysterionica, Ipecacuanha (*e.g.*, in 'Stearettes' or 'Formagules' to avoid vomiting), Holarrhena, Krebisote, Ipecacuanha sine Emetina, Ipecac. Co. Pulv., Kosam Seeds, Magnesium and Sodium Sulphates, Naphthalene, Opium, Plumbi Acetas, Pot. Permang., Salicylic Acid by Rectal Injection, Sedeff, Simaruba, Syr. Ægle Marmelos Co., Tannin, Trilactine, Tylcalsin, Tyllithin, Terebenum purum, Terebinth l., and Stupes of, Yeast, Dysentery Vaccine.

Ether and Caffeine hypodermically for cases of tropical dysentery when atient *in extremis*.

Excellent results reported in dysentery with injections of 10 Cc. of a 10% lution of Calcium Chloride with Morphine, subcutaneously.—D.m.W., r Jl. A.M.A., ii./25,1521.

Amœbic Dysentery and 'Carriers.'—Auremetine, Conessine, Emetine jections and Emetine Periodide or Emetine Bismuth Iodide (*vide* Ipecacuha chapter), Simaruba, Stovarsol.

The chapter on Ipecac. and Emetine should be carefully studied.

E. Histolytica, Incidence of and other protozoa among healthy entries the Navy.— H. A. Baylis, L. i./19,54.

Calomel recommended for treatment of obstinate amœbic dysentery, in ses of 0·03 Gm. 12 times a day for 3 days, followed by 3 days' treatment ith Bismuth Subnitrate (0·5 Gm. 12 times daily), in cases where usual treatent has no effect. Definite disappearance of the amœbæ.—G. Beijnen, per . Trop. Med., Aug. 1/23,256.

Lamblial dysentery well treated with Carbon Tetrachloride.—M. Khalil and Shawky, Jl. Trop. Med., Sept. 15/23,285.

Yatren advised *per os* and as irrigant following appendicostomy.—R. E. rake-Brockman, L. i./26,905.

Bacillary Dysentery.—Emetine, Silver Gelatose (*i.e.*, Albargin), *q.v.* nema 1 to 1½ pints, strength 1 grain to 1 ounce. Formalin *diluted* as rectal jection (painful).

Symptomatology of the bacillary and amœbic forms.—Consult papers der 'Emetine' and 'Dysentery' in Vaccine chapter.

Rhubarb (*q.v.*) stated to be magical but no effect on bacilli in laboratory.

Readily responds to saline treatment and if given early Magnesium Sulphate, drachm every two hours, will relieve the distressing symptoms.—An Indian ysician, C. and D., Sept. 1921, p. 378.

Contrary to the accepted view that dysentery is a disease of hot weather d generally spread by flies, the highest incidence of cases at Claybury was und to occur during the winter months. Bacilli of the Flexner type isolated. imary attacks and relapses may be so slight as to pass unnoticed and there a possibility of every case remaining a chronic carrier. Strict observaon and permanent isolation needed.—W. S. Dawson and W. Moodie, L. /21,225.

Stovarsol well spoken of or a mixture of Tincture of Ferric Chloride 20 m., ith Mercuric Chloride Solution ½ dr., in ½ oz. of water, further diluted hen taken—thrice daily, continued for months and given with a nightly dose Liquid Paraffin to counteract constipation.—R. E. Drake-Brockman, . i./26,905.

Dysmenorrhœa.—Actæa, Æther Spt. cum Opii. Tinct., Amyl Nitris, piol, Belladonna Suppository, Benzyl Benzoate (?), Butyl Chloral Camphor, nnabis, Cannabis and Chloral, Castor, Chloretone, Cibalgin, Elixir Ergotæ Ferro, Gelsemium preps., Gossypii Rad. Cort., Liq. Cauloph, et Pulsatilla, aiacum Resin Cachets, Mist. Dysmenorrhœica, Mist. Morphin. Phenazon. ., of W. W. W., Opium, Ovules Morphine, and others, Piscidia, Potass. omid., Pulsa, Pulsatilla, Salix nigra, Saw Palmetto, Serpentaria, Sodii licylas, Styptol, Stypticin, Syr. Iodo-Tannicus, Tab. Ergot Senecin Comp., lerian, Viburnum.

The following has been found useful:—Potassium Bromide 160 grains, loral Hydrate 80 grains, Nepenthe 80 minims, Elixir Viburnum Co. 2 nces. Water to 8 ounces. ½ oz. *t.d.s.p.r.n.ex aq.*

Ductless and other gland Tablets, with or without the addition of antiasmodics, in dysmenorrhea.—L. G Phillips, B.M.J. i./23,1054. See our ges on Corp. Lut., Pituitary, Ovarian, Testic.

Dyspepsia.—Acid. Carbolic, Acid. Nit. Dil., Acid. Hydroch. Dil., Acidin, kagen Tabs., Aloin. Ammon. Carb., Ammon. Chloridum., Arsenic. Atropine ethyl Bromide, Bisciniod, Bismuth Comps., 'Bismuth and Pancreatin,' jnput Ol., Calcii Peroxid., Capsicum, Capsul. Fe. Glyceroph Co., Capsul. lerian Co., Catha Milk and Glyceroph., Cerii Oxalas, Charbon Naphtole, ndurango, Creosote, Creosoti, Valerianas, Diascordium, Elixir Gentianæ id, Eupatorium, Fæxin, Gentiana, Gingerin, Helba, Hydrarg. cum Creta, ydrastis, Hydrocyanic Acid, Hysterionica, Lecithin Elixir and Emulsion, ptandra, Liquor Pepsinæ et Caffeinæ, Liq. and Tabellæ, Papain et Iridin, thia-Bism. Citras, Liq. Bism. Tart., Magnesia Cream, Magnesii Hydroxidum cum Carbone, Mist. Carminative, Nux Vomica, Oleum 'Elliott' caps., Oleum Valerianæ, Pancreatin, Papain Glycerin Acid, Peptonising Powders, Pepsin, Pepsin and Bismuth Tablets, Podophyllin, Quassin, Quinine preps., Rhei Rad. Pulv., Sal Polychrestum, Sedeff, Serpentary, Sodii Bicarb., Sodii Hyposulphis, Sodii Sulphocarb., Sodii Taurocholas, Sodium Bism. Citras, Sodium Citrate for adding to Milk, Spirit Meliss, Comp., Tab. Bismuth Pepsin et Cascara, Thyroid and Manganese, Tinct. Bellad., Tinct. Caryophylli, Tinct. Rhei Aquos, Trilactine, Troch. Antacidi., Pulv. Dyspeptic Co.

It has been suggested to conclude each meal in strange places with a few drops of Hydrochloric Acid to reinforce the action of the gastric juice. For general use, should be in larger doses than those usually given, *e.g.*, 10 to 15 drops in ½ pint of sweetened water, as a drink during or after meals.

Investigation of dyspeptics. Classification of dyspepsias into groups—A.—Due to organic diseases of the stomach (including pylorus, duodenum) *e.g.* ulcer, carcinoma, gastritis; B.—Reflex dyspepsias due to organic disease elsewhere in the alimentary tract; C.—From failure to lead a physiological life, *e.g.* over-eating, under-eating, inefficient mastication, drinking, etc.; D.—Due to general states of ill health, *e.g.* debility associated with muscular hypotonus, loss of natural fat deposits and consequent visceroptosis; E.—Due to nervous tricks, nervous exhaustion, worry, hysteria, etc.—John Ryle, B.M.J. i./23,5.

Benzonaphthol in small dose with Magnesium Carbonate and a little charcoal in the middle of each meal used in France.—B.M./F.W. XV.

For Fæces Examination see Vol. II.

Dyspnœa.—Æther Spt., Æthyl Iodid., Alcohol, Ammon. Carb., Amyl Nitris, Erythrol Nitrate Tablets, Euphorbia Peplus, Ibogaine, Lobelia and Lobeline, Morphine, Nitroglycerin, Oxygen and Alcohol, Oxygen injected, Ozonic Ether, Pil. Caffein Tri-Iodid. Co., Quebracho, Sodii Nitris, Strychnine.

Earache. *Locally.—Atropinæ Liquor or Oleatum* (*diluted*), *Chloroformi Vapour, Cocaina cum Oleo, Glyc. Acid Carbolic* 6 *grains to ounce, slightly warmed,* 2 *or* 3 *drops, Guttæ Spiritus c. Formalin, Menthol-Paraffin Capsules, Morphinæ Oleatum* (*diluted*), *Opii Tinct. cum Oleo Oliveræ, Ung. Lanoboric Camphorat. See* **Aurinaria,** *also* **Nebulæ.**

Liquid Paraffin for soft wax in the meatus in ear affections.—T. B. Layton, Pr., Apl./20,299.

Ecbolics.—Ergot preparations, Lead, Savin, all drastic purgatives.

Eclampsia.—Amyl Nitrite Sterules. Chloral Hydras. Erythrol Nitrate Tabellæ, Morphine, Musk, Nitroglycerin, Papaverine, Parathyroid, Pilocarpine, Veratrum, Thyroid, Sodium Acetate Injections ½ drachm to the pint. *Routine Treatment.—Purgatives, e.g.*, Jalap, Mag. Sulph., Calomel and Croton Oil. *Diaphoretics.*—Pilocarpine (of great value). *Nerve Sedatives.*—Bromides, Chloral, Morphine in varied dose.

Hirudin, Calcium Chloride, Potassium Chloride, Serum Treatment, removal of colostrum, hot packs and hot air bath, Oxygen, the injection of air or Oxygen and Potassium Iodide into the mammæ, and lumbar anæsthesia have also been used. R. A. Gibbons recommends venesection combined with the endeavour to eliminate the poison and dilution with Saline Transfusion. (Not advised by all.)

Strogonoff's method includes Morphine subcutaneously and Chloral per rectum in alternate doses and at stated intervals. The Dublin method includes Morphine (alone) in total doses of ½ to 1½ grains.—T. W. Eden, B.M.J. ii./22,675.

Ecthyma.—Ol. Tereb. in Oil injection.

Eczema.—Arsenobenzol and Arsenicals, Ca. Lactate, Ca. Iodid., Harrogate Water, Iron Salts, Milk and Glyceroph., Ol. Morrhuæ, Phosphorus, Sod. Cit., Sod. Brom. intrav., Sod. Silicas intrav., Sulphides, Sulphur, Thyroid, Three Gland and Four Gland Tablets, Trilactine (Tabs. and Milk), Vaccine Staphylococcic.

Locally.—Acid. Boric., Acid Camphoric. Lotio and Ung., Acid Carbolic, Lotio and Ung. Acid Salicylic Ung. and Ol., Acid Picric Solution ½ to 1% *and Ol., Alibour Water, Alkaline lotions, Anserine Mulls Medicated, Argent. Nitrat. Sol.* (*particularly for mucous surfaces of anus, vulva, etc.*), *Balsamum Lanolinatum, Bismuth Nit. Glycerin., Colloidal Silver, Mercury, etc., Calaminæ Lotio* (*et Oleosa*), *Calcii Chlorid. Ungt.* 6%, *Calcis Aqua, Calcis Linim., Chrysarobini Ung.* (*weak*), *Cremor Sicc. preps., Creolin, Cupri Sulph., Diachyli Ung., Formalin, Moist* (*for dry condition*), *Formosyl, Formosyl Huile de Cade, Hydrogen Perox., Ichthyol and Collodion and paste of, Iodates, Kaolin Ung., Lanolin* *io Nigra, Lotio Plumbi Lactat., Formosyl dusting powder, Methylene Blue, elocene, Naphthol, Paraffin No. 7, Pellanthum preps., Perfumed Formosyls, noloid Disinfectant (diluted), Pigment Olei Eucalypt. et Ac. Salicyl., Sodii b., Sulphur Colloidal, Ung. Hydrogen Perox., Ung. Thorii Oleatis, Ung. nicis, Ung. Rusci Co., Vleminckx's Solution, 'X' rays and Finsen Light, ci Boras, Zinci Cremor, Zinc Ions (Pustular eczema), Zinci Oleat. Pulv. and 1., Zinci Ung.*

itment of Liquor Carbonis Detergens 1, Ung. Hyd. Nit. 3, Ung. Simplicis 4. lso Liq. Carbonis Det. in Lotion c. Liq. Plumbi *a.a.* 3 to 4%.

czema of Infants, obstinate.—Thyroid Gland has been suggested.— ndardised preparations).

eborrhœic eczema is attributable to a relative acidosis. Alkalis, *e.g.*, the ture of Langdon Brown as used for control of acidosis in diabetes, effectual— ium Bicarbonate 1 drachm, Potassium Citrate 30 grains, Calcium Lactate ains, Magnesium Carbonate 5 grains, Chloroform Water to 1 ounce.—H.M. ber and H. C. Semon, B.M.J. ii./18,245.

nfantile eczema well treated by Purified Coal Tar and Zinc Oxide of each 2 ts, Corn Starch and Vaseline of each 16 parts.—H. MacCormac, L.ii./23,242.

n obstinate cases rapid improvement obtained by Tar Paint: Crude Coal 1 ounce, Collodion 1 ounce, Acetone 1 ounce. Applied with brush, re- ted every two or three days. Other treatments described.—H. G. Adam- , L. i./25,350.

-Rays often invaluable.—H. G. Adamson, L. i./25,351.

lectric Current Injuries.—*See* **Radiology** Vol. II.

lephantiasis.—Arsamin, Pituitary Extract.

metics.—Apomorphine $\frac{1}{10}$ grain inject. hypod., Antim. Tart. 1 to 2 grains, Vinum 2 to 4 drachms, Ipecac. 30 grains, and Vinum 4 to 6 drachms, tard a tablespoonful, Sodii Chloridum a tablespoonful, Zinci Sulphas 20 to grains. *See also* **Poisons and Antidotes.**

mpyema.—Hydrogen Peroxide for washing the pleura (10%), Strepto- cal, and Pneumo. Vaccine. Succus Allii.

ouching with Dakin's Solution.

cute pleural empyema—value of injection of 2% Formalin in Glycerin rphy's).—H. Wade, B.M.J. ii./21,150.

mphysema.—Iodides and Iodine preparations, *e.g.* Caffeine Tri-Iodide. atient too stout add Thyroid to the Iodine. If excess of lime in the blood ium or Potassium Citrate or Limonade Purgative. Keep bowels open 1 Sodii Sulph. Coramine.

reatment of pulmonary emphysema.—per Pr., June, '26,434.

ncephalitis Epidemic (previously called Encephalitis Lethargica. *See Vol. II.*). Hyd. Salicyl. Injection.

etiology. Not as yet established. Outbreaks have followed epidemics of ienza also of poliomyelitis.

athology. A small coccoid organism has been isolated, filtrable, present he secretion of the naso-pharynx. The cerebro-spinal fluid shows only oderate degree of lymphocytosis. Urea and sugar are definitely increased. tone is present in small amount.

ymptoms. Vary with each epidemic. Stupor is the most characteristic ure, lasting for a varying period. There is a focal disturbance of the vous system, *e.g.* paresis of the ocular muscles.—Pres., Aug./20, p. 290; ./21,65. See also A. Howell, Pr., April 1920.

.M.A. Discussion on, opened by Ivy McKenzie, B.M.J. ii./27,532. Patho- , by J. Godwin Greenfield, *ibid.* 535. Chronic encephalitis, G. Riddoch, . 537. Mental aspects, by R. MacNab Marshall, *ibid.* 539.

eep patient at rest and free from worry; give Ammonium Bromide or oralamide if necessary.—Wilfred Harris, B.M.J. i./21,47.

utbreak in a small school at Radway in Warwickshire.—L. L. Fyfe, L. 3,379.

llied to polio-encephalitis, but is not identical.—B.M.J. ii./21,205.

he Ministry of Health issued a pamphlet (1924) on, revising that of 1921.

he incidence of the disease is highest from January to March—a striking trast with that of poliomyelitis. Hexamine *per os*, hypodermically and avenously, disappointing. The residual symptoms or sequelæ are resistant very therapeutic measure.—C. M. H. Howell, B.M.J. i./25,437.

here is derangement of carbohydrate metabolism, as shown by blood ır estimations. The hyperglycemia suggests that the disease is a toxæmia usually acute in onset but becoming chronic in nature. Hyoscine thought specific. Found to be of undoubted value though temporary. Start with 1/150 grain once a day if given hypodermically increased if necessary to 1/50 grain. If given *per os* larger doses may be employed thrice daily, preferably after meals.—P. K. McCowan and co-workers, B.M.J. i./26,779; L. i./26,802.

Encephalitis lethargica in England. In many cases transient or permanent relief with diminution of stupor follows withdrawal of cerebro-spinal fluid. Hypnotics not advised. Hexamine, if given, should be given in small doses with caution. Belladonna has been advised by Hall in chronic forms.—A. Salusbury, B.M.J. i./26,1073. See also B.M.J. i./21,277.

Chronic epidemic encephalitis treated by intraspinal injections of Casein, ½ Cc. of 10% solution added to 10 Cc. Normal Saline. Advisable to start with small dose, *e.g.*, ½ mgr.—B.M.J.E. ii./24,63.

Hexamine, 10 to 12 Gm. per diem, intravenously or intramuscularly, combined with oral use to limit of tolerance. Intraspinal injections of 1 to 2 Gm. per day also given. Sodium Iodide, 50% solution intravenously in doses slowly increasing from 6 to 20 Cc. per day, used by some. Sodium Salicylate, 1 to 6 or even 8 Gm. per diem intravenously, in 4% solution, said to be brilliant. —B.M.J.E. ii./26,26.

Encephalitis lethargica treated by 'Influenza' compound vaccine.—J. Pirie, L. i./24,1184.

Intraspinal injection of serum obtained from convalescent patients spoken favourably of in acute cases, but of no use in patients suffering from Parkinsonian syndrome.—per L. i./27,193.

Treatment by induced malaria.—P. K. McCowan and L. C. Cook, L. ii./27, 861.

Appreciable improvement in 35 cases of encephalitis lethargica, associated with Parkinsonism, after treatment by ultra-violet rays. The entire body was exposed to radiation twice weekly for 6 to 7 weeks, the maximum exposure being 10 minutes to both back and front at a distance of 16 inches from a Mercury-Vapour lamp, or preferably 3 lamps used simultaneously.—H. N. Jaffe, B.M.J. ii./27,1219.

Acriflavine Inj. Intrav. has been advised.

Difficulty of Diagnosis.—Of 16 cases admitted to Monsall Hospital as encephalitis 11 were other conditions, including tuberculous meningitis, brain abscess and brain tumour.—J. C. Earl. L. i./25,873,

Difficulties with children. Most liable to be confused are gastro-enteritis, tuberculous meningitis and pneumonia.—J. L. Halliday, L. i./25,763.

The relation of paralysis agitans to the Parkinsonian syndrome of encephalitis.—René Cruchet, L.ii./25,263.

cf. Parkinsonism.

Endocarditis.—Aconite. Arsenic, Belladonna. Caffeina. Collargol. Coronillæ Ext., Digitalis, Fæxin, Ferric Chloride, Nuclein and Anti-Streptococcic Serum and Vaccine, Pituitary Extract, Pneumo. Vaccine, Sod. Cacodyl., Veratrum.

Locally.—Belladonna Plaster, Blisters, Ice Bag.

Autogenous Vaccine and Autogenous Serum (latter if possible). A grave case recovered under.—See Strepto. Vaccine.

Endocarditis Bacteriology, diagnosis and treatment. Positive blood cultures in the chronic cases by no means invariable. Almost entirely streptococci.—Sir Thos. Horder, L. i./26,695,745,850.

Endocarditis, Rheumatic.—Gentian Violet intrav., Tylcalsin intrav.

Endometritis.—*Locally.—Injectio Formalin, Copper Sulphate* (*and Ionised*) *also Zinc Ions. Local use of Churchill's Iodine Tinct. Pond's Tampons.*

Swabbing and irrigation with a Solution of Iodine (1 in 10) 1 part and Glycerin 7 parts.—R. Hobbs, B.M.J. ii./21,35. B. Coli Vaccine.

Enteritis.—*See* Gastroenteritis.

Enuresis.—Atropine, Belladonna, Ergot Hyoscine Hyoscyamus with Sodium Bromide, Hexamine, Lycopodium, Potassii Citras, Rhus Tox., Thyroid Extract (Standardised Preps.).—*See also* Incontinence of Urine.

Sulphonal 1 grain for each year of the child's life every night for the first week, every other night for the second week, and every third night for the third often permanently cures enuresis.—T. Fisher, L. ii./17, 728.

Epididymitis—Aconite, Antimonial Wine, Iodides, Saline Purgatives, Gono. Vaccine.

Locally.—Atropine Suppos. (1/75 *gr.*) *and hypod., Colloidal Mercury and*

Silver, Ice, Iodine, Guaiacol, Iohydrin, Iodum Oleat., Lin. Potassii Iodid., Ung. Iodi Intinctum. Heat, with moisture, Mercury, and Belladonna Ointments.

Epilepsy.—Adonis, Æthyleni Bromid., Ammon. Bromid., Amyleni Hydras., Amyl Nitris, Antifebrin, Argent. Cyanid or Nit., Arsenic. Arsen. Brom., Atropine, Auri Bromid and Chlorid., Belladonna, Borax, Bromalbumen, Bromalin, Bromal Hydras, Brominol, Calcium Bromide, Calcium Lactate, Camphora Monobromata, Crotalin, Cannabis, Chloral, Elix. Calcii Chlorid., Hydrargyr Biniodidum, Liquor Auri et Arsenii Bromid. and Liquor Auri et Hydrargi. Bromid., Luminal Sodium, Magnesium Bromide, Manganese Bromide. Mistura Brominol cum Nux Vomica, Morphine Methyl Brom., Nitroglycerin Tabellæ, Ozonic Ether, Palladium Colloidal, Peptone Therapy, Picrotoxin, Potass. Boro-Tart. Potass. Bromid., Pot. Nitris. Santonin. Scutellaria. Sodii Bromid., Sodii Nitris, Thyroid, Urea-Bromine, Valerianates, Viscum album, Zinc Salts. Parathyroid. Prevent constipation.—Cascara, Calomel, etc.

In most cases Bromides are not of the slightest value and in many are actually pernicious.—C. A. Mercier, B.M.J. ii./15,624.

Potassium Bromide 1 ounce, Potassium Bicarbonate ½ ounce, Liquor Arsenicalis 1½ drachms, Liquor Arsen. et Hydrarg. Iodide 3 drachms, water to 8 ounces. Signa: Two drachms in water after meals three times a day. 'Marvellous in effects.'—P.J. i./15,150.

Fits, epileptic and others.—Anthony Feiling, Pr., July, 1921.

Bromides, Borates, Calcium Lactate, Zinc Oxide, Picrotoxin, Belladonna and Luminal in epilepsy.—Gordon Holmes, L. i./23,501.

The following was found of value: (1) Ammonium Bromide 4 drachms, Urotropine 2 drachms, Chloroform Water to 6 ounces. 1/12 part taken in water night and morning, (2) Sodium Citrate—one teaspoonful in ½ tumbler of water night and morning.

The power of Ammonium Bromide to prevent fits is raised by giving the other drugs. Causation thought to be the Colon bacillus.—E. J. McC. Morris, L. i./26,834.

The blood sugar is usually low. Glucose 50-100 Gm., or sugary foods, combined with Luminal and Bromides, recommended.—Presse Med., Nov., '25,1475, per Pres., Jan., '27,18.

Episcleritis:—A seasonal disease of the eye occurring more particularly in certain humid districts—to be differentiated from the diffuse tuberculous episcleritis which occurs in patients with other signs of tuberculosis. The disease though serious enough in itself rarely threatens the integrity of the eye. It is chiefly superficial, involving the episcleral tissues. Antirheumatic remedies are given for two or three weeks or more. Then good results may be obtained from Colchicum. Given soon after the onset Colchicum undoubtedly shortens its course, *e.g.* Tincture B.P. (of seeds) in 15 m. doses thrice daily combined with Sodium or Magnesium Sulphate.—P. A. Harry, Pres., May '20,198.

Epistaxis.—Acid. Gallic., Aconite, Acetanilide, Calcium Chloride and Elixir Ferro-Alumen, Ferri Perchlorid. Hamamelis, Terebinth. Oleum.

Locally.—Acid Tannic., Adrenalin, Alumen, Amyl Nitris (inhaled), Ferri et Quininæ Chloridum, Ice, Hamamelis, Hydrogen Peroxide.

The best position during an attack of epistaxis is reclining in an easy chair with the hands clasped behind the head, and the collar loosened. No styptic—*plain dry wool is all that is necessary.* Cold may be applied to the nape of the neck or to the bridge of the nose with the idea of causing reflex contraction of the bleeding vessels; if it is not quickly successful it should not be persisted in. Hot water (at 115° Fahr.) injected with a syringe may prove successful where other means fail. **If this fails, introduce a strip of ribbon gauze, about 18** inches long, soaked in equal parts of Adrenalin Chloride (1 in 1,000) and Cocaine Hydrochloride (20%), so as to bring it in contact, as far as possible, with all parts of the nasal mucosa; after 5 or 6 minutes the plug should be withdrawn and an attempt made to discover the bleeding spot by means of a head-light and speculum; should the bleeding spot be discovered it may be possible to control it by direct pressure or by application of the galvano-cautery, or if the bleeding persists the nose should be packed with strips of ribbon gauze.—E. W. Roughton, Pr., Oct. 1910.

Epithelioma.—Radium, *see also* Cancer.

Erysipelas.—Acetanilide, Aconite, Aconitina and Granules of. Antifebrin, Antistreptococcic Serum, Belladonna, Digitalis, Ergot, Fæxin, Fæxin Extract, Ferri Perchlorid., Mang. Butyrate, Milk Infections, Nuclein, Veratrum viride, Streptococcal Vaccine, Buttermilk internally and locally.

Locally.—Acid. Picric Pigment, Acid. Sulphuros. Lotio, Argent. Nit., Belladonnæ Glycerin., Calaminæ Lotio, Creosote, Gossyp. Acid. Boric., Ichthosulphol, Iodine, Iodii Tinct. injected (q.v.), Iodum Oleatum, Ung. Iodi Intinctum, Liq. Alum Acet., Liq. Fe. Perchlor., Mag. Sulph. Solution, hot fomentation, Oleoge Comps., Ol. Tereb in Oil Injectio, Pasta Plumbi cum Cupro.

Liq. Ferri Perchlor. 20 or 25 m. thrice daily acts almost as a specific., Collodion locally helps.—B.M.J. i./20,352.

Erythema.—Febrifuge Salines, Aconite, Anthemis, Calcii Lactas, Salicin, Salicylates, Salol, Trilactine, Sulphur Stearettes.

Locally.—Diachyli Ung., Hazel Foam preps., Kaolin and Lotio, or Ung., Papav. Infus., Perfumed Formosyls, Plumbi Subacet. Lotio., Vaseline, Zinci Oxid. and Ung., Ung. Thorii Oleat, High Frequency Current, Pellanthum preps.

Erythema nodosum—an acute specific fever.—J. O. Symes, B.M.J. ii./21, 741. Uninfluenced by Sodium Salicylate but cured by Calcium Chloride with local sedatives and rest.—**H. Hallam**, B.M.J. ii./21,917.

Erythroedema.—Treatment not satisfactory—attention to diet and painting the gum with 1% Chromic Acid to prevent secondary infection, the main points. Large doses of Atropine or Calcium Lactate suggested.—J. S. Fowler, B.M.J. i./25,1078.

Erythræmia.—Phenylhydrazine has a specific effect in destroying erythrocytes. There is a marked reduction in blood volume directly proportional to destruction of the erythrocytes and when anæmia has been produced a relative increase in plasma volume is noted. *Dose*, 0·1 Gm. given three times daily. Each Gm. of Phenylhydrazine destroys on an average 6 Gm. of hæmoglobin. Discontinue the drug when the erythrocyte count drops to 4,500,000 per c.mm.—B.M.J.E. ii./26,66.

Espundia.—Antim. Pot. Tart.

Exhaustion.—Nervous and Muscular.—Oxygen Inhalation (and with Alcohol), Amyl Nitrite, Stimulants, Catha Milk and Glycerophos., Coca preps., Coca Wine. *Cf.* other headings, *e.g.*, **Anæmia, Collapse and Fainting, Debility, Food, Hæmorrhage, Nervous debility, etc.**

Exophthalmic Goitre (Graves' Disease).—Arsenic, Calcium Salts, Digitalis, Fucus, Iodine, *e.g.*, as Lugol's Solution, Iron Salts, Pituitary Dried (Posterior lobe), Quin. Hydrobrom. Sulphate, and other preps., Suprarenal Gland, Sodii Phosph., Thymus Gland, Thyroidectin, Fresh Thyroidless Goats' Milk.

Locally.—Acid Sulphuros, Tinct. Iodi Oleosa., Ung. Iodi Intinctum, and Iohydrin, X rays.

Possibly there is not only an increase in the amount of thyroid secretion formed and absorbed, but in some cases the proportion between the different ingredients of the secretion vary. Suprarenal gland feeding has been tried, but is not well spoken of.—' X ' ray treatment is best.—G. R. Murray, B.M.J. ii./13,163 ; L. ii./13,200.

Arsenic, Bromides, Belladonna, Convallaria and Quinine Hydrobromide. —G. R. Murray, B.M.J. i./22,906.

Tryptophane absorbed from the intestine believed to cause exophthalmic goitre.—D. J. Harries, B.M.J. i./23,191,553.

Treatment of exophthalmic goitre.—F. R. Fraser, B.M.J. i./26,555.

Great importance is attached to the anæsthetic used in thyroid surgery, and either local anæsthesia (Novocain 0·25%), or open Ether or Ether by the intratracheal route, is advised.—T. P. Dunhill, B.M.J. ii./27,1089.

(Iodoform has tendency to produce symptoms of exophthalmic goitre in susceptible persons.)

See also Goitre (simple).

Eye : Optic Atrophy. Retinal extract has been very unexpectedly successful.

Eye : Pupil, Contractors of.—*Arecoline in 1% solution, Jaborandi and Pilocarpine, Opium and Morphine, Physostigma, Physostigmine.*

Eye : Pupil, Dilators of.—*Atropine Salts, Cocaine, Daturine, Duboisine, Ephedrine, Homatropine and Hyoscine salts, Hyoscyamine, Nicotine, Oleum Homatropinæ.*

Organic Extracts, *e.g.*, suprarenal and pituitary, have marked effect as pupil *dilators*,—thymus, ovary, muscle and kidney less.

Eye : Local Dilator, but Contracts when given internally in suitable doses—Gelseminine.

Ocular pain. Acriflavine, 1 in 4,000 for irrigation (but is not germicidal) before operation and after. Heat, and hot sponging and fomentations good. Dionine unreliable—very severe conjunctivitis had followed. Massive doses of Salicylates, Milk injections.—Freeland Fergus, and discussion, B.M.J. ii./25,506.

Fainting.—*See* **Collapse.**

Fat, to reduce, *see* **Obesity.**

Favus.—*See* **Parasites, Vegetable, on Skin.**

Fetid Breath.—*See* **Breath, Fetid.**

Fetid Perspiration.—*See* **Perspiration, Fetid.**

Fetid Nasal Discharges.—*See* **Ozæna.**

Fever.—Acetanilide, Acid. Salicylic, Aconite, Amidopyrin, Ammon. Acet. Liq. and Carb., Ammon. Cit., Antimony, Aspirin, Bisciniod, Cinchonine, Cinchonidinæ Sulph., Cryogenin, Digitalis, Gelsemium, Granules d'Aconitine, Mist. Arsen. Quin. et Ferri, Magisal, Phenacetin, Phenazone, Pulvis Quininæ Comp., Potassii Borotartras, Potass. Acet. Chloras and Citras, Pilula Antimon. Conii et Quinin., Quinine preps., Quinetum, Salicin, Salipyrin, Sodii Salicylas, Tylcalsin, Tyllithin, Veratrum Viride, Warburg's Tincture, Helba, Quinine Acetyl-Salicylate.

Aspirin, Phenacetin and Dover's Powder combined. Tablets are made.

Fibrosis, Chronic Subcutaneous.—Fucus, Thyroid, Diabetic Diet, Massage.

Fibrositis, Acute.—Amidopyrin with Aspirin. *Locally.—Chloral et Menthol, Methyl Aspriodine, Pigment Camphoræ. See also* Rheumatism.

Filariasis.—Organic Arsenic Compounds. Pepper and Capsicum, *e.g.*, Tinct. Capsici, thought to be prophylactic. Antimony Sod. Tart., also Antim. Pot. Tart. suggested but corroboration needed.

Filariasis Expedition to British Guiana. There is evidence that filariasis is a house infection. Blood examination shows that where one or two pronounced cases of the disease are found other members of the house, though apparently healthy, harbour the nematode. More than one species of mosquito is capable of acting as host. It is hoped to determine how many. —B.M.J. ii./21,19.

Fissures of Nipples. *Locally.—Acid Boric, Acid. Tannic Glycerin., Alcohol, Argent. Nit. pigment, Cocainæ Hydroch. Liquor, Collodium Flexile, Hydrastis Tinct., Styptic. Colloid., Tinct. Benzoin Co.*

Fistula in ano (Tuberculous). *Locally.—Hydrogen Perox., Inj. Bismuth Subnit., Iodine Suppos., Iodoform Oil after operation, Pot. Permang. (packing with), Zinc ions.*

Flatulence.—Acid. Carbolic, Acid. Sulphuros., Æther Spt., Alkagen Tabs., Asafetida, Anise, Anethol, Aq. Carminativa, Betol, Bisciniod, Bismuth preps., Cajuput Ol., Capsicum, Carbo Ligni, Caraway, Cardamoms, Chloromorphiæ Liquor, Cinnamon, Cloves and Tincture, Coriander, Creosote, Fennel, Magnesia preps., Menth. Pip. Ol., Myristica, Naphthalene, Naphthol, Nux Vomica, Pepsin preps., Sodii Bicarb., Sodii Sulphis, Sulpho-carbolates, Tinct. Carminativa, Trilactine, Zingiberis Tinct.

Treatment of.—T. L. Hardy, L. ii./25,345,394.

Flies to Ward Off. *See* **Bites and Stings.**

Food Products.—*See* **Chapter on Nutrimenta,** (also Infant Feeding), Casein Preparations. For invalids are: Benger's Food, Catha Milk and Glyceroph., Conf. Glyceroph. Co., Enema Nutriens, Ferrocarnis, Herogen, Kreochyle, Kolentos, Peptonoids of Beef, Milk and Glycerophosph., Nutrient Suppositories, Peptonised Milk, Peptonised Beef Jelly, Pancreatised Farinaceous Food, Pancreatised Emulsion of Fat, Trilactine.

For Diabetic Foods, see Nutriments, Vol. I. For Bread Standardisation, Flour Bleaching, and Caloric Values of Foods, see Nutrimenta, Vol. II.

Artificial Feeding.—Dextrose (Glucose) Enema. Glucose Injection.

Fractures, **for applying extension in.—Sinclair's Glue, Heusner's Glue.**

Frambœsia.—Organic Arsenic Comps.

Efficacy of Sulfarsenol and Silver Salvarsan is about equal. Three injections are necessary to cure the lesions and render them spirochæte free. Sulfarsenol is equally efficacious either intravenously or subcutaneously, but intramuscularly it is too painful. Silver Salvarsan intravenously does not produce any bigger fall of systolic blood pressure than Sulfarsenol—there is no fall of blood pressure after subcutaneous injections of the latter.—R. Knowles, Jl. Trop. Med., Dec. 1/23,360. *See* also Yaws.

Freckles. *Locally.—Æsculin Ungt., Hazel Foam, Boric Acid Lotion, Corrosive Sublimate Lotion, Lactic Acid Lotion, Cucumber Ointment, Formosyl (diluted), Mistura Amygdalæ, Thorii Oleat. Ung. diluted to a cream, Ung. Plumbi Carbonatis.*

Sunburn.—Quinine Acid Hydrochloride 5, dissolve in water 10, and add to Anhydrous Wool fat 70, mix Cod Liver Oil 25 with this, and finally add Ionone *q.s.*—B.M.J. ii./26,718.

Frost Bite.—*Friction with snow or cold water in a cold room best.* Friction with Turpentine and Oil or with Spirit and Soap Liniment useful in early stages and after that the limbs should be raised on pillows and wrapped in cotton wool. If blisters form or discoloration shows that gangrene is probable rub with Turpentine to clean the skin or with Spirit containing 1 in 500 Biniodide—or with Iodine.—A. W. Mayo-Robson. Keep the parts *cold* with foot raised slightly—smeared with some ointment, *e.g.*, Carron Oil, with 2% Cocaine useful. Wrapping up *causes* pain.—B. Moynihan. Where there is moist gangrene, and especially where toxic absorption has taken place—amputation, —R. H. Jocelyn Swan. Counter irritants—Tincture of Iodine, Turpentine, etc., relieve pain for a time, but do not materially affect speed of recovery. —C. Max Page. Boric Zinc and Starch Powder.—F. McG. Loughnane.

Frost Bite : local baths of 5% Calcium Chloride.—B.M.J. E.ii./25,80.

Furunculosis, *vide* **Boils.**

Furunculosis Orientalis.—Inj. Antim Ox., and Antim. Pot. Tart. For Nile boils—Strepto. vaccine.

Gall Stones and Hepatic Colic.—Æther Spt., Amyl Nitris, Amyl Valerianate, Anæsthetics, Apium, Petroselinum Inf., Capsul. Sodii Oleat. Comp., Chloral Hydras, Hexamine, Magnesium Sulphate, Mercurials, Morphine preps., Nitroglycerin, Perles of Ether and Turpentine, Pil. Sodii Oleat, Podophyllin, Salicylates, Sodium Benzoate, Sodium Glycochlate, Various Mineral Waters, *q.v.*

Gall Stones, formation of. There seems little doubt that the deposit of the main cementing substance, calcium bilirubin, depends on the precipitation of this substance from bile by the excess of mucus which is excreted as a result of the catarrhal conditions of the gall bladder. Surgical treatment. —F. Macrae, B.M.J. ii./22,1098.

Gall bladder disease. In the early stages of milder cases the symptoms are often reflex and gastric. During an attack of indigestion, pain and tenderness over the gall bladder, with or without fever, the patient should remain in bed on light (not too milky) diet. Give a mixture of Hexamine, Sodium Salicylate, Sodium Benzoate, Sodium Bicarbonate, Spirit of Chloroform and Infusion of Cloves.—Sir Humphrey Rolleston, L. i./23,40. See also L. i./25, 1207.

In cholecystitis, hepatic calculus, ulcerative colitis, and in some cases of ankylostomiasis, good results are obtained by duodenal lavage. The following have been used beneficially : Argyrol and Protargol 0·75 to 1·5%, Silver Nitrate 1 in 20,000, Magnesium Sulphate and Jutte's solution, the latter consisting of Sodium Chloride 0·9% and Sodium Sulphate 0·9%, using 1 to 1½ litres for a lavage.—L. i./25,1309.

Gall-Bladder Visualisation.—Bromo-ray (Tetrabromphenolphthalein), Iodo-ray (Tetraiodophenolphthalein), Sod. and Stront. Bromide. See p. 679.

Gangrene.—Nitroglycerin, Amyl Nitris Quinine Hydrochloride, Sodium Nitrite.

Locally.—Acid Carbolic, Acid Nitric, Creosote, Hydrogen Perox., Iodine Injection (vagina), Saline Injection (vulva).

Periarterial injection of Alcohol in gangrene of the extremities. 2 to 3 m. at four points round circumference of artery and into outer coat.—S. Handley, B.M.J. ii./26,1121.

Gangrene of toe cured by placing foot as often and as long as possible in warm water, gradually raised to a point just bearable, containing 5% Sodium Bicarbonate. Toe smeared at night with warm Glycerin and Belladonna and enveloped in cotton wool.—J. P. Gray, L. ii./26,1347.

Gas Poisoning. *See* GAS under **Antidotes to Poisons.**

Gastralgia.—Acid. Hydrocyanic Dil., Æther Spt., Alkalis, Belladonna, Bisedia, Bisciniod, Bismuthi Oxy-Bromid., Bismuth Oleas, Bismuthi Salicylas, Bismuth Tart. Solub., Bromides, Calcis Aqua, Cannabis, Catha Milk and Glyceroph., Cerii Oxalas, Chloroform, Chloromorphiæ Liq., Coca and Cocaine, Codeina, Creosote, Ginger, Magnesia, Cremor Magnesiæ, Manganesii, Oxid., Pepsin, Sedeff, Iodates, Chloretone, Cyanides, Menthol, Nitroglycerin, Trilactine.

Locally.—Linim. Sinapis, Ung. Ipecac. et Crotonis.

Gastric Secretion, to diminish.—Atropine small dose in large vol. of water on empty stomach

To increase secretion wash the stomach with a weak pilocarpine solution, or employ Sodium Bicarbonate. Magnesium Oxide and Bismuth Oxycarbonate have a less stimulating effect. Small doses of Hydrochloric Acid in achlorhydria can only have a psychic effect. They become neutralised by regurgitation of alkali from the duodenum.-T. Izod Bennett, B.M.J. i./23,366.

Gastritis and Enteritis.—Acid Hydrocyanic, Acid Lactic, Alkalis, Ammon. Chlor., Aperfine, Bismuth preps., Biscinlod, Caffeine, Calcii Permang. and Salicylas, Carminatives and Sedatives, Collargol, Hexamine, Hydrastis, Hydrog. Perox., Ispaghula, Kaolin, Mist. Catarrhalis, Pot. Cit., Saline Transfusion, Salines, Salol, Sanguinaria, Sodii Sulphis, Strontium Salts, Tar Perles, Trilactine Tablets, Milk, &c. *Vide also* **Catarrh, Gastric.**

Favourable results in treatment of enteritis with an iodised autogenous vaccine made from patients' stools, 15 to 20 intramuscular injections being given at intervals of one to three days.—Comptes Rend., per Jl. A.M.A. ii./25,1337.

Gastric Ulcer.—*See* **Ulcers, Gastric.**

Hæmatemesis of.—Adrenalin, Beef Peptones.

Gingivitis, *see* **Gums, Inflamed** also **Vincent's Angina.**

Glanders.—Mallein, by hypodermic injection. Mercurial Inunctions, Salvarsan.

Glands, Enlarged.—Calcii Chlorid., Ferri Iodid. and Iron Salts, Ferri Cacodylas, Iodoprotein Tabs., Iodum, Morrhuæ Ol., Potass. Iodid., Sodii Iodid., Syrupus Iodo-Tannicus.

Locally.—Cadmii Iodid. Ung., Hydrarg. Oleat. and Emplast., Iodi Decolor. Tinct., Iodoform, Iod. Linim. and Ung., Iohydrin, Pot. Iodid. Ung.

Glandular fever.—An acute infectious disease, principally of children; rapid enlargement of the cervical glands; less constant enlargement of liver, spleen, axillary, inguinal and other glands. Outbreaks.—H. Letheby Tidy, and E. B. Morley, B.M.J. i./21,452.

Glaucoma.—*Physostigminæ Sulph. Pilocarpina Nit.* (2%), *Alkaloidal Oil of Physostigmine* (1%), *Arecoline, Adrenalin* (0·01%), *Dionine* 5 *or* 10% *or pdr.*—B.M.J.E. ii./25,10.

Iridectomy constitutes a drain for a limited time.

Good results in glaucoma from combined administration of 1·5 to 2·0 mgr. Adrenalin (according to age and weight of patient), a cachet of 0·1 to 0.2 Gm. Ergotin, and 1 to 2 Gm. Calcium Chloride in aqueous solution.—L. i./27,1380.

Congestive glaucoma. Combined use of Morphine ¼ grain and Nitrogycerin (an alkaline mixture containing Bicarbonate and Citrate of Potash and Soda with 1 minim of Liq. Trinitrini, for a dose every 3 hours), cuts short an attack. Local arterio-sclerosis has been proved to exist in glaucoma.—J. Burdon-Cooper, B.M.J. ii./25,510.

Glossitis.—Hydrarg. Perchlor. in Lotion (2 gr. to 8 ounces).

Glycosuria.—*See* **Diabetes.**

Goitre.—Goitre is prevalent in magnesian-limestone districts, for example, Derbyshire—hence the name 'Derbyshire Neck.' Ammon. Fluorid., Arsenic, Barii Chloridum, Belladonna, Bromides, B. Coli Vaccine, Convallaria, Hydrarg. Biniodid., Hydrastis, Iodum, Naphthol, Phosphorus, Pituitary Gland Dry (entire gland), also Posterior lobe alone, Potass. Iodid., Quinine Periodide, Sodii Iodid., Syr. Ferri Iodid., Thymus Gland, Thymol in large doses, Thyroid feeding and preps., Thyroid and Manganese, Trilactine Milk.

Locally.—Acid. Acetic. inj., hypod., Hydrarg. Biniodid, Ung. Hydrarg. Oleat., Hydrarg. Ung., Iodi inj. hypod., T.H., Ung. Hyd. Iodid. (diluted), Iodi Linim. and Ung. Zinc Salts, Cocaine, Ionisation, 'X' rays.

Small doses of Potassium Iodide (*q.v.*) or Sodium Iodide efficacious in districts where it is endemic but this is quite unsuited for those who already show signs of hyperthyroidism.—G. R. Murray.

It is added to salt. *Vide* Sod. Iodid.

Injections of Phenol, Iodine Tincture and Glycerin, equal parts. Relieves the thyrotoxicosis, as in *exophthalmic* goitre, but relief is only temporary.—Sheehan and Newcomb, Jl. A.M.A., Jan./20,81. *See also* L. i. 20,827.

Acute goitre almost completely disappeared under Quinidine Sulphate given for coincident heart affection.—L. i./23,712.

The principal areas of endemic goitre are the Himalayas, the Alps, the Andes, the Great Lakes of N. America, and districts in Oregon, Washington and British Columbia, the immediate cause being deficiency in the iodine store of the thyroid.—Pres., May '24,189 Adolescent goitre should be treated medically, unless attended by pressure symptoms; colloid goitre patients should receive Iodine up to the age of 25— beyond that medical aid is of no value. After 30, surgery is necessary in adenomata. Exophthalmic goitre is a surgical condition.—J. W. Hinton, *ibid.* 190. Prophylaxis in goitre centres should begin before school age—indeed, it should begin with the mother by means of iodized table salts.—*ibid.* 191. Iodine treatment should be controlled by the B.M.R. any exaggeration of which forbids the drug.—*ibid.* Graves's disease caused by Iodine administration during menopause.—*ibid.* From 30 to 50% of all persons in Switzerland have no iodine, or only traces, in their thyroids during a large part of the year.—*ibid.* There is an inverse ratio amount of Iodine in surface waters to distribution of goitre. Iodine in water indicates presence in the soil; it is concentrated by plants, and received through food. Iodine is present in igneous rocks—but its liberation from these is slow. Most of the Iodine in the world is in the sea. Atmospheric Iodine is derived from sea spray and the burning of coal. Plea for examination of local waters for Iodine content.—J. F. McClendon and A. Williams, *ibid.*

Goitre in childhood. Iodine curative but care needed. In some cases exophthalmic symptoms found to follow it.—E. H. M. Milligan, B.M.J. ii./26, 373.

The relation of goitre to rheumatism.—L. J. Llewellyn, Pres., Nov., '26, 403-8.

Margate, Ramsgate, and Bath Waters are all hard. The Kent waters are associated with little goitre. The chalky waters in Derbyshire are associated with it. Bath water with a lot of lime causes less goitre than the soft supply of Glossop.—E. H. M. Milligan, B.M.J. ii./26,577.

'Goitre can now be considered a thing of the past' at the Royal Military Asylum, Sanawar, due to the installation of a chemically and bacteriologically pure water supply *containing no Iodine.*—R. McCarrison, B.M.J. i./27,95 *vide* also our pp. 715 and 918.

Experimental production of a new type of goitre unrelated to Iodine deficiency, the basal factor in causation being a diet containing more than 60% white flour or vitamin-poor carbohydrate, 20% or less protein with fats, and inorganic salts (including Iodine) in adequate amounts, but no green vegetables or fruit. Likely to occur sporadically amongst white-flour-eating people, in which case additional Iodine in the food will not prevent it, but a well balanced vitamin-rich diet will.—R. McCarrison, L. i./27,920.

Goitre may be due to deficiencies in Vitamins A, B, or C, particularly B. —P. H. J. Turton, B.M.J. ii./27,897.

Enlargement of the gland takes place when the Iodine content falls below one-quarter of its normal or below 0·1% of the dried gland.—K. Fraser, Cumberland School M.O. Report, 1925.

GOITRE EXOPHTHALMIC *see* EXOPHTHALMIC.

Gonococcal Arthritis.—Gonococcus Vaccine, Vaginal Douche with Hyd. Perchlor. Lotion (of women), Mag. Sulph. Solution, hot fomentation, Santalol, Tylcalsin and Tyllithin. See also Gonorrhœa.

Gonorrhœa.—Buchu, Camphoric Acid, Copaiba, Cubebs, Cyperi Caps., Erigeron Oil, Helmitol, Hexamin, Manganese Butyrate injn., Methylene Blue, Ol. Cedri Atlantic, Pichi, Potassium Salts, Saline Aperients, Salix nigra, Salol, Santal preps., Santalol, also Santalol-Methyl-Salicyl Caps., Sodium Acid Phosph., Saw Palmetto, Sodii Salicyl. (especially acute posterior urethritis), Uva Ursi, Gonococcus Vaccine, Mineral Waters, *e.g.*, Vittel.

Locally.—Acid. Carbolic., Acid. Salicyl 2% *alcoholic solution compresses. Acid. Tannic, Acriflavine, Argenti Acetas, Nitras Injection and Bougies, Argent. Iodid., Bismuth Oxyiodid., Bougies Urethral, Collapsubes various (see Index), Collargol, Colloidal Ag. and Hg., Glyc. Plumb. Acet. (compresses), Hydrarg. Oxycyanid., Hydrarg. Perchlor., Hydrog. Perox., Iodargol, Iodoformi Cereolus, Iodof. et Eucalypti Cereolus, Manganese Colloidal, Mercurome, Neisser's Bougies, Proflavine, Potass. Permang., Protargol, Resorcin, Zinci Acetas, Chlorid., Permang., and Sulphocarbolas, Zinc Sulphanilas. For female,* *Pessaries of Ichthyol or Iodine, Argenti Iodidum, Hydrastis, Ovules various,* see text, Zinc and other Ionisation.

Marked success from Permanganate Solution, 1 in 1,000 given to men with instructions.—Sir A. Reid and P.H. Boyden, L. i./19,212.

Gangrenous cystitis of gonococcal origin. Bladder irrigated with 1 in 5,000 Silver Nitrate. Patient died of gonococcal septicæmia.—A. Clifford Morson, B.M.J. i./19,129.

Gonorrhœa of female treated by solution of Methylene Blue 1, Glycerin 25, Water to 100 by swabbing with gauze plug soaked in the solution *in situ* 24 hours.—R. Stafford Ross, B.M.J. i./20,434

Sodium Tuarocholate q.v. thought to be prophylactic.

Gonorrhœa treated by electrolysis. Fluid used is 1% Sodium Chloride and 0·5% Monochloracetic Acid. This acid is less decomposed by the current than the salt, and it is able to neutralise the alkalinity which the liberated Sodium would otherwise deposit against the urethral membrane. Current ½ to 1 m.a.—C. Russ, B.M.J. i./21,1108.

Irrigations with Dichloramine-T 1 in 4,000 also Albargin same strength. Picric Acid 1 in 400 to 1 in 200 is an extremely potent germicide and gives good results when tolerated.—D. Lees, B.M.J. ii./21,480.

Over 50% of the men with gonorrhœa coming for consultation found to be over-treated. Every intra-urethral instrument, except a few Teevan's catheters and some gum elastic bougies ought to be burnt.—J. E. R. McDonagh, Pr., Jan., 1921.

Growth, to Stimulate.—Pituitary gland dry (anterior lobe) has been thought to. Tethelin (also used locally). *See also* Debility, Marasmus, etc.

Gout.—Acid. Quinic., Acid. Thyminic, Arsenic, Aspirin, Aspriodine, Bromal Hydras., Caffein Tri-iodide, Cimicifuga, Colchicine Salicylas (Capsules), Colchicum and Colchicin, Elix. Acid Salicyl. Co., Formates, Glycerophosphates Guaiacum, Hexamine, Iodine Tinct., Iodolysin, Iron preps., Lithium Salts, Lithion, Magnes. et Sodii Sulph., Phenazon and with Codeine, Phenoquin and Neophenoquin, Piperazin Glycerophosphate, Phenyl-Aspriodine, Phenyl-Sedasprin, Piperazin and Phenocoll Granular Eff., Piperidine Tartras, Radio-active Waters, Pistoia Powders, Potass. Acet., Cit., Iod., Pot. Chloride as Table Salt, Sodii Bicarb., Benz., Hippuras, Iodid., Phosph., Salicyl, Sesquiphos. and Taurocholas, Solani Ext. Liq., Syr. Ferri Iodidi, Trilactine, Tyllithin, Urea Quinate, Veratrum.

Locally.—Amysal, Borax Solution, Cade Oil, Cocaine Ionisation, Chloroform Liniment, Collod. Salol, Ionised Lithium, Methysal Balm, Nauheim Bath Salts, Radium. 'X' Rays are useful. Ra Emanation Inhalation. Salicylic Acid, also Iodine Ionised.

A bacterial toxin is the primary factor. Adequate removal of the intestinal contents at the commencement of attack will reduce the symptoms.—Luff

Calf Lymph Vaccination has improved Gout.

Acetic Extract of Colchicum, B.P.85—is best, the effective dose being 2 to 6 grains.—J. S. Matthews, B.M.J. ii./19,271.

Humoral Syndrome of gout.—A. Chauffard, B.M.J. i./22,745.

For Acute Gout. Tinctures of Colchicum, Aconite, Jalap Co., and Quinine, of each *p. equales* 30 drops thrice daily in a glass of hot water. Local application compresses soaked with Methyl Salicylate or Laudanum.—Per Pr., Aug. '26,130.

Deposits of Sodium Biurate occur in the bones. This, unlike the Calcium salt, is *not* opaque to X-Rays, and when sufficient Calcium Salt has been displaced by the Sodium salt a clear area can be seen. Estimation of the Uric Acid in the blood is helpful. A high figure, above 3 mgr. per 100 Cc., is strongly in favour of gout.

Treatment.—Colchicum relieves pain and shortens the attack, but of no value in prevention. Phenoquin (Cinchopen) of most value. In one case a mass of Sodium Biurate weighing 35 Gm. was removed by a patient under treatment from a sinus over the knee. It has produced some unpleasant after-effects, including jaundice, and death. Not to be used where there is any disturbance, *e.g.*, urticaria, or gastric intestinal upset.—G. Graham, Geoffrey Evans, W. Langdon Brown, and others.—B.M.J. ii./26,688.

Granular Eyelids. *See* Ophthalmia Tarsi.

Granuloma Inguinale.—Antim. Pot. Tart.

Graves' Disease.—*See* **Exophthalmic Goitre.**

Guinea Worm.—Emily, a French naval surgeon, succeeded in killing the parasite by injecting Mercuric Chloride solution 1 in 1,000 into the body of the worm.—Sir P. Manson, Tropical Diseases, 1919. *See also* J. Graham Forbes, L. i./20,837. Injections tried subcutaneously into the protruding head.

N.A.B. 0·15 Gm. in 20 Cc. Distilled Water used.—C. G. Grey, L. ii./20,100.

Antimony Tartrate used intravenously.—J. W. S. Macfie, L. i./20,654.

Gums Inflamed and Spongy. *Locally.—Acid. Carbolic., Alumen, Anise mouth wash, Borated Hydrogen Peroxide, Catechu, Cocaine, Cremor Magnesiæ, Formosyl Mouth Wash, Iodi Tinct., et cum Aconiti Tinct., Iodine Colloidal, Krameriæ Tinct., Liq. Antisepticus, Magnes. Lact., Myrrhæ et Boracis Tinct., Potass. Chlorat., Pastil, Tablet and Troch., Pyrethri Tinct., Sodii Chloras and Troch., Thymaglycin.*

Acute ulcerative gingivitis—Thymol water, and after drying swabbing with 5% Silver Nitrate Solution, and again washing with Thymol.—C. J. Colyer, B.M.J. ii./18,396.

Well treated by carefully touching the gum margins with wool saturated in Chromic Acid solution 1 in 5. After about a minute Hydrogen Peroxide 10 vols. should be applied. Three or four Chlorate of Potash tablets should be sucked daily between meals.—S. H. Woods, Jl. R.A.M.C., Oct., '26,248.

Hæmatemesis.—Acid. Sulph. Dil., Acid Tannic, Adrenalin, Alumen, Argenti Nitras, Ergota, Gum Acacia Sterules Injection, Hamamelis, Iron Persalts, Peptonised Milk, Plumbi Acet., Suprarenal Extract, Terebinth. Ol.

Hæmaturia.—Acid. Gallic., Antimony, Camphor, Cannabis, Erigeron Canadense, Ergota, Hamamelis, Rhus aromatica, Terebinth. Ol.

Vesical Injections of Adrenalin, Alum, Gallic Acid, Hamamelis.

Hæmochromatosis.—A peculiar morbid condition showing an accumulation of free iron-containing pigment in the liver, pancreas and retroperitoneal glands.—T. Shawn Dunn, L. ii./21,334.

A case.—S. Linley Heald, B.M.J. ii./22,542.

Hæmophilia.—Calcii Chlorid. and Lactas, Elix. Sod. Lactat., Magnes. Chlorid., Carbonas and Lactas, Hamamelis, Hydrastis, Iron Persalts, and for surface bleeding see local remedies under Hæmorrhage. Phenazone in Ferri Perchlor., see Phenazone. Blood Transfusion.

Hæmoptysis.—Acid. Pyrogallic., Acid. Sclerotic., Acid. Sulph. Dil., Alumen, Alum. Aceto. Tart. ***Amyl Nitrite Sterules,*** Atropine, Bromides, Calcium Lactate, Chloral, Digitalis, Ergota, and Ergotin Gum, Acacia with Saline, Hæmoplastin, Hamamelis, Morphine, Nitroglycerin, Phenazone, Rectal Injection of Calcium Chloride, Turpentine, Viscum preps.

Locally.—Atomised Spray of Alum or Monsel's Salt Solution, Hæmoplastin, Turpentine.

Hæmoglobinuria.—Ammonium Chloride, Calc. Lact., Iron Tonics.

Hæmorrhage of Wounds.—Calcium Chloride and Lactate, Digitalis, Epinine, Ergota, Ergotin, Ferri et Quininæ Chlorid., Ferro-Alumen, Gelatin, Gum Acacia with Saline Injection, Terebinth Ol. (*locally, value internally doubtful*). Blood Transfusion. *See also* **Wounds.**

Hæmorrhage from bullet wounds in chest has been controlled by inhalation of Amyl Nitrite.

Local Applications to Wounds and Bleeding Surfaces.—*Acid. Tannic, Albumen, Amadou, Anserine Mulls Medicated, Bryonia, Catechu, Cupri Sulph., Cupri Sulphocarbolas, Epinine, Erigeron Oleum, Eucalyptus Gum, Eusol, Ferri Perchlorid., Ferro-Alumen. Hamamelis, Hydrog. Perox., Monsel's Solution, Potassium Permanganate, Proflavine, Sphagnum Dressings, Styptic Colloid., Thromboplastin, Tinct. Benz. Co., Turpentine, Zinci Chlorid. Liq.* *See also* **Wounds.**

Eau de Cologne was used by the French Military Surgeons in the war to cleanse wounds. *See also* **Wounds.**

Hæmorrhage, Dental, after Extraction.—

Locally.—Adrenalin, Amadou, Ergotinine Injection, Ferri Perchlor., Tannin Tinct. Benz. Co., Turpentine, Zinc Sulphate, Zinc Sulphate with Morph. Acet.

If extensive laceration of the tissue has been necessary, anodyne mouth wash, *e.g.*, Zinc Sulphate 8 grains, Zinc Chloride 6 grains, Morphine Acetate 2 grains. Water to 8 ounces.—Smale and Colyer.

Hot water (blood having an insufficient amount of fibrinogen coagulates at 160° F.) Chloroform Water (2%), Sandarach Varnish.

Potass. Permang. Ung. (4% in Vaseline) or Potass. Permang. and Kaolin with small quantity Vaseline.

Gauze soaked in Oil of Turpentine good.—L. i./22,1006.

Hæmorrhage from Leech-bites, to arrest. *Locally.—Adrenalin, Alum, Tinct. Myrrh., Monsel's Solution.*

Hæmorrhage from the Nose.—*See* **Epistaxis**.

Hæmorrhage, Intestinal—Calcium Chloride, Ergot, Lead Acetate with Camphor or Opium, Gum Acac. Intrav., Suprarenal preps., Turpentine.

Locally.—Styptic Enemata of Adrenalin, Alum, Copper Salts, Gelatinum Calcii Chlor., Monsel's Salt, Tannin.

Hæmorrhage, Uterine and Post Partum.—Amyl Nitris inhaled, Camphor Inject., Curschmann's Inj., Cotarnin, Ergot. preps., Ferri et Quininæ Chlorid., Gum Acacia with Saline, Hydrastin, Normal Serum, Pituitary Ext., Strychnina and Salts, Suprarenal preps., Mistura Ergotæ cum Ferro. Blood Transfusion.

Locally.—Adrenalin, Alumen, Ferri Perchlorid., Gossyp. and Liquor.

Ergot and Acetic Acid given immediately after birth of child useful to prevent puerperal hæmorrhage.—B.M.J. ii./21,59.

Aluminium Acetate, 2 to 3% solution used, never failed to arrest hæmorrhage from inertia of uterus at childbirth.—Per Pres., Jan. '23,33.

Chloroform by far the commonest cause and often responsible for the death of the child. If anæsthesia is necessary Ether best.—E. Vipont Brown. L. i./23,1338.

Uterine hæmorrhage, Discussion on. The term 'metrostaxis' should replace metrorrhagia.—B.M.J. ii./26,723, *et seq.*

In excessive uterine bleeding of the menorrhagic type, without fibroids or malignant disease, Calcium Lactate, 60 grains a day for a week, and intramuscular injections of Pituitary are useful. Radium Bromide, 100 mgr. left in the uterine cavity for 24 hours, or 50 mgr. for 36 hours, is sometimes curative. Chronic cervicitis is contraindicative of Radium treatment.—S. Gordon Luker, B.M.J. i./27,912.

Hæmorrhoids.—Suitable laxatives are Cascagar, Conf. Piper., Conf. Sennæ, Infus., and Mist. Senna Co., Pulv. Glycyrrhizæ Co., 'Hindu Dates.' *Sansiviera Ext. Liq., Stillingia*, Sulphur, Trilactine.

Ext. Coca Liq. *q.v.*, an emergency dose acts like a charm.

Locally.—Acid Boric Ung., Bismuth Oleas, Bism. Subiodate, Coninæ Ung. Gallæ cum Opio Ung., Collapsubes—Bismuth, Calcium Chloride Injection for bleeding, Cupri Oleas, Glyc. and Ung. Chrysarobin, Hamamelid. Liq., Iodine Suppos., Lotio Plumbi Spirituosus, Perfumed Formosyls, Ranunculi Ficariæ Ung., Sanusin Sempules, Stovaine Ointment, Suppos. Bellad. et Morph., Suppos. Cocain et Morph., Suppos. Hamam., Conii et Eucainæ, Suppos. Hamam. et Hydrarg. Co., Suppos. Hæmorrhoidal, Suppos. Suprarenal et Morph., Ung. Adrenalin, Ung. Bismuth et Cocain, Ung. Hyd. Subchlor. for irritation, Ung. Thorii Oleat, Zinc Ions.

Injection treatment.—Carbolic Acid 48 grains, Glycerin 2 drachms. Water 2 drachms. Dose: 2 to 6 minims has been injected into each internal pile, A. S. Morley, B.M.J. i./21,265; L. i./23,1288. For details of Injection of Carbolic Acid in Hamamelis see Hamamelis, also Sodium Salicylate.

Injection into each visible hæmorrhoid—drawn out and made prominent by Bier's suction pump—of from 2 to 5 Cc of a 95% solution of alcohol.—Boas, per Clin. Jl., Oct. 3/23,479.

Calamine freely powdered on a pad and tied in position useful.—J. C. Lyth, B.M.J. i./21,265.

Quin. Urea HCl. Injn. *q.v.*

Hair, to Promote Growth of, *c.* SEBORRHŒA.—Bone Marrow, Hæmoglobin and Tonics.

Locally.—Amyl Nitrite, Cantharides, Jaborandi Liniment, Pilocarpine Lotion, Resorcin Lotion, Sublimate in Spirit Lotion.

Hair, to Remove.—Thallium Acetate has been given internally for epilation in ringworm, but we do not advise it.

Locally.—Barium Sulphide, Calcium Sulphide, Corrosive Sublimate Alcoholic Pigment (with caution), Glucose Paste, Pigmentum Thymol, Sodii Sulphid. 25 *to 40%, Aq. Sol., 'X' rays, Electric Needle.*

Halitosis. See **Breath, Fetid.**

Hay Fever.—*For Diagnosis: Protein Skin Tests.*

Arsenic, Aspriodine, Belladonna, Calcii Lactas (full doses), Calc. Brom. Intrav., Camphor, Ephedrine, Grindelia, Hyd. Salicyl, Ethyl and Diacetyl Morph. Hydrochlor., 'Old English Fever Mixture,' Peptone injns., Potass.

Iodid., Quinine preps., Hay Fever Vaccine, B. Coli and catarrhal organisms, Vaccine Autog. (?). Thyroid Feeding (Standardised preps.).

Locally.—Acid. Salicylic. Pulv., Adrenalin, Bismuth. Co. Pulv., Carbolised Smelling Salts, Compound Asthma Fluid Vapor, Cocain Hydroch. Liquor., Douche of Mercuric Iodide, 1 in 2,000, Eucalypti Oleum, Hydrogen Perox. Nasal Spray, Menthol, Menthol and Camphor, Nebulæ, Pigmentum Antisepticum, Pimento and Eucalyp. Snuff, Pulv. Lobeliæ Comp., Quininæ Collunarium, Stramonium Fumes, Suprarenal Extract, Terebene.

Vestibule of the nose treated with Silver Nitrate 30 grains to the ounce especially two spots, one high up on the outer wall and the second the floor from ½ to ¾ inch back from the orifice. No application made to the mucous membrane. Good in hay fever and rhinorrhœa.—M. Agar, B.M.J. ii./20,125.

Desensitisation with pollen, or on non-specific lines with Peptone *q.v.*

Headache, Bilious or Sick.—Caps. Ol. Elliott., Chloro-Sodio-Magnesian Aperient, Colalin, Elixir Gentian. Acid., Euonymin, Guarana, Hydrastis, Iridin, Liq. and Tabellæ Pepsinæ et Caffeinæ, Ol. Ricini Aromat., Phenacetin, Phenazone, Podophyllin, Sodii Citras, Sodii Phosph. Efferves., Sodii Sulph. Efferves., Sodio-Magnes. Sulph. Efferves., Sedeff, Sodio-Mag. Sulph. with Caffeine.

Headache, Congestive or Inflammatory.— Actæa, Colchicum, Ergot, Ammon. Chlorid., Antimony, Hydrarg. Subchlorid., Maricol, Phenazone, Ricini Ol., Salicylates of Sodium, &c., Sedeff, Trilactine, Veratri Viridis Tinct.

Headache, Nervous.—Acid Hydrobromic, Acid Hydrocyanic, Actæa, Amidopyrin, Ammon. Arom. Spt., Arsenic Atropine, Auri Bromidum, Belladonna, Bromides, Butyl Chloral, Caffeine, Calc. Lactate, Camphora, Cannabis, Chloralamide, Cibalgin, Cimicifugin, Elix. Acetanilid Co., Elixir Anti-Neuralgicum, Elixir Caffeinæ, Ferri Valerianas, Gelsemium, Guarana, Ibogaine, Iodo-Caffeine, Iodo-Theobromine, Iron Salts, Kola, Magisal, Phenyl-Sedasprin, Methylene Blue, Migralgin, Nitroglycerin, Phenacetin, Phenazone, Pulv. Calc. Glyceroph. et Lac. exsicc., Quininæ Valerianas, Sedasprin, Syr. Neurotonic; Sedeff, Sodii Citras, Theobromine, Lithium Benzoate, Trilactine, Tylcalsin, Tyllithin.

Nitroglycerin with Strychnine (Tabellæ).—Gowers.

A prescriber's note—per C. D.—If of *dietary origin*, 20 grains of sodium bicarb. with tinctures of gentian and cardamoms will probably have the desired effect. If *due to fatigue*, 10 grains of phenazone with 1 dr. of spt. ammon. arom., and perhaps a little gentian, is indicated. If of *influenzal origin*, 10 grains of sodium salicylate with 6 grains of phenacetin and the same adjuvants will probably act as magic.

Locally.—Formosyl cone.

Migraine, Discussion on.—Exception is taken to the synonyms 'bilious headache' and 'sick headache.' Epilepsy and migraine compared and contrasted. Both are characterised by paroxysms which tend to recur with periodicity. In both, the attacks may be ushered in by an aura. Heredity plays a part in etiology. Peptone therapy has been attended with promising temporary results. Luminal, 1½ grains, *n.s.*, Bromides, Nitrites.—E. Bramwell, B.M.J. ii./26,765.

Migraine from the ophthalmic standpoint. Visual symptoms and phenomena frequently associated with attacks. Reviewed from the writings of Gowers and others. There is an interesting relation between migraine and urticaria—first one, then the other, may attack the subject. Errors of refraction are found in a number of cases.—W. H. McMullen, B.M.J. ii./26,769.

Migraine well treated with 2-4 drachms, 50% of solution of Magnesium Sulphate an hour before rising; patient to lie semi-prone on his right side for an hour, and then to take a tumblerful of hot water or hot weak tea; no food for a day or half day previous. Treatment once a week or once a fortnight. Fats, eggs, chocolates, cocoa, coffee and alcohol strictly limited.—H. C. Rook, L. i./27,706.

Lauder Brunton's prescription of 20 grains Sodium Salicylate and 15 grains Potassium Bromide always gave relief in half an hour.—J. W. Yeatman, B.M.J. i./27,215.

Headache Powder.—Caffeine Sodium Benzoate, 0·1 Gm., Pyramidon and Sodium Salicylate of each 0·2 Gm. One or two cachets a day. A useful recipe.

Heart.—See **Cardiac Tonics** and **Dropsy, Cardiac,** also Vasodilators.

Heel, Painful, caused by numerous influences. A prevalent cause of acute pain of sudden onset round the heel is a true teno-synovitis of the tendo

Achillis. Compound Mercury Ointment is curative.—W. Fletcher Stiell, Pr., May 22/345.

Hepatic Colic.—*See* **Calculi, Biliary.**

Hepatitis.—Emetine and See Emetine Chapter.

Hernia. *Locally.—Intraspinal Injection of Anæsthetics prior to operating.*

Herpes Zoster.—Arsenic e.g. Fowler's Solution, Morphinæ inj. hypod. (for pain), Quinine preps., Salines and Saline Aperients. General Tonics. *Locally.—Anodyne Colloid, Carron Oil (or mixed with Zinc Oxide Ointment* 3 : 1), *Bismuth. Oleas, Calamine Lotion, Cocain preps., Collodium, Hydrarg. Ammon., Cremor Sicc. preps., Ung., Hydrarg. Oleat. Ung., Hydrog. Perox., Ichthyol, Menthol pigment or Unguent (for pain), Perfumed Formosyls, Quinine Ionisation, Zinci Oleat. Ung., Zinci Ung.*

Paraffin as an occlusive dressing applied daily gives quick and complete relief from pain in herpes zoster.—H. Fox, per Clin. Jl., Mar. 7/23,119.

Herpes zoster ophthalmicus. The following by Gowers gave relief of pain: Caffeine Citrate, Sodium Iodide, Sodium Salicylate, Salicin, of each 5 grains, Phenazone 10 grains. One powder every four hours as required.—S. Lodge and W. O. Lodge, B.M.J. i./23,1085.

Picric Acid in zona. The following lightly applied every second day effects a cure—in no case more than 5 applications necessary. Picric Acid 50 Gm., Sulphur, Ether and Pure Alcohol 50 Gm., of each.—per Pr., Sept. '23/230.

Herpes zoster oticus and allied conditions. The oticus is rare—about 1 in 20,000 cases of ear diseases.—T. Guthrie, L.i/26,710.

Hiccough.—Adrenalin Solution, Æther. Spt., Amyl Nitris, Benzyl Alcohol for persistent, Camphora, Capsici Tinct., Chloral, Chlorof. Spt., Extract. Ergotæ Liq., Liq. Ammon. Acet., Lobeline, Morphine preps., Musk, Ol. Succini, Pilocarpine Hydroch. Sedeff, Sodii Bicarb., Trilactine, Valerian Tinct.

Ether intramuscularly (25 to 30 minims) gives relief.

Treatment of persistent hiccup.—C. F. T. East, L. ii./26,140.

Hodgkin's Disease —See **Lymphadenoma.**

Hookworm.—*See* **Ankylostomiasis and Worms.**

Hordeolum. *Locally.—Argent. Nit., Belladonnæ Fortus, Hydrarg. c. Morphina Oleat., Iodi Tinct., Ung. Hydrarg. Oxidi Flavi, Ung. Metallorum.*

Hydrarthrosis. *Locally.—Cataplasma Salicyl. Co., Scott's Dressing. See also* ŒDEMA.

Hydrophobia.—*Immediate use of Actual or Electric Cautery, or Nitric Acid or Argent. Nit. Solid, or other caustic paste at hand.* Anti-rabic Vaccine. *See* recent work, Vol. II.

Hyperchlorhydria.—Alkalis, Belladonna, Bismuth and Pancreatin. *see also Vol. II., Exam. of Stomach Contents,* ' Belladonna best to inhibit secretion, Bismuth. Tart. Solub., Bismuth Calc. Phosph., Kaolin, Cerium Oxalate, Glycogen, Mag. Carb. Lev., Nux Vomica (large doses), Ol. Olivæ, Pepsin, Sedeff.

Hyperchlorhydria well treated by Sodium Bromide, 2 to 3 Gm. a day. Harmless in doses of 6 to 7 Gm. even when continued for some time.—B.M.J.E. i./26,60.

Hyperhidrosis.—*See* **Perspiration, excessive.**

Hyperpiesia and Hyperpiesis.—See Blood Pressure to reduce, Cardiac Tonics, and Dropsy, Cardiac; also Vasodilators.

A monograph on the study of 47 cases by H. Batty Shaw. Its cause is a toxin of protein origin and pre-renal in its site of production. Review.—L. i./22,437.

Hyperiesis thought to be a condition of permanent hypertension. Any systolic pressure persistently as high as 170 mm. mercury or over comes into the category.—Geoffrey Evans, B.M.J. ii./25,1167.

Hyper and Hypo-Thyroidism, *v. p.* 991.

For the cardiac complications of hyperthyroidism Quinidine Sulphate is considered superior to Digitalis.—Pres., May '27,172.

Hypertrichosis.—*See* **Hair to Remove.**

Hypnotics.—*See* **Insomnia.**

Hysteria.—Actæa, Allii Ol. Essent., Amyl Nitris, Asafetida, Auri Bromidum, Auri Chlorid., Belladonna, Brom-albumen, Calcium, Magnesium, Manganese and other Bromides, Cannabis Indica, Ibogaine, Iron Salts, Liq. Antihystericus, Lupuli Tinct., Magisal, Nux Vomica, Ol. Succini, Ovarian Gland, Phosphorus, Pulsatilla, Quinine Preps., Sedasprin, Sedeff, Spirit Ammon. Arom., Syr. Pilocarpin et Pot. Brom., Strychnine, Sumbul, Valerian and Valerianates, Zinc Salts.

Ichthyosis. *Locally.—Resorcin (q.v.) and Salicylic Acid.*

Ileus, Acute, with stercoral vomiting successfully treated with rectal injection of human bile 2 ounces in Saline 4 ounces. In one case vomited bile was injected into the same patient, but when possible freshly secreted human bile from a cholecystography case was used. This may be kept in an ice chest for at least a week without losing any of its potency. Ox Bile was not satisfactory.—R. St. Leger Brockman, L. ii./27,320,992. *See also* CONSTIPATION (CHOLINE, ETC.).

Impetigo.—Remove crusts with Olive Oil or by Boric Starch Poultice; then 10% *Ammoniated Mercury Ointment, Acriflavine, Brilliant Green Ointment Eusol,* and *see* **Eczema.**

Bockhart's impetigo. Lotion of Potassium Permanganate 15 grains, Sodium Bicarbonate 10 grains, water 1 ounce, applied daily with satisfactory results. —J. A. Scott, B.M.J. ii./22,977.

Impetigo Contagiosa.—Best results followed the application of Acriflavine Emulsion 1 in 1,000.—J. F. Christie, B.M.J. ii./27,1033.

Impotence.—Arsenic, Auri et Sodii Chloridum, Cannabis Indica and Cannabin Tannas, Cantharides, Coca and Cocaine, Damiana, Easton's Syrup, Ferri Perchlorid., Formates, Glycerophosphates, Gokhru, Ibogaine, Muirapuama, Nux Vomica, Phosphorus, Pilula Potentin Co., Piperazina, Sanguinaria, Strychnine, Testicular Extract and Injection. Theobromine Lithium Benzoate, Yohimbine, Zinci Phosphid.

Yohimbine to our knowledge caused unpleasant subsequent effects.

Painting the spermatic (or ovarian) artery with a 7% aqueous solution of Carbolic Acid produces marked hyperæmia of testicle (or ovary) with enlargement of gland. In hypofunction, secretion of hormones is decidedly increased and there is remarkable improvement of appetite, general appearance better, and physical and psychic activity increased. Should be tried for organic impotence before other and more drastic measures, *e.g.*, vasectomy or vasoligature.—Doppler, L. i./27,309.

Incontinence of Semen.—Arsenic, Auri et Sodii Chloridum, Belladonna, Bromides, Camphor Monobromide, Chloral, Ergota, Ferri Perchlorid., Ferri Phosph. and Ferri Phosph. c. Quin. et Strych. Syrup., Gokhru, Hyoscine, Hyoscyamine, Phenazone, Salix nigra.

Incontinence of Urine.—Ammon. Brom., Arsenic, Belladonna, Brominol, Buchu, Calcii Glycerophosph., Calcii Phosph., Calomel to regulate bowels, Camphor Monobrom., Cantharides, Ergota, Ferri Iodid., Ferri Perchlorid., Gokhru, Hyoscyamus, Lycopodii Tinct., Naphthalin, Nux Vomica, Phenazone, Potass. Cit., Rhus Aromatic Ext. Liq., Liq. Strychnine (Ringer), Thyroid Gland (Standardised Liquor or Tablets).

See also abst. of paper by F. Hernaman-Johnson, p. 223.

Causes of frequency of micturition.—W. K. Irwin, Pr., Mar. 22/203.

Indigestion.—*See* **Dyspepsia.**

Inebriety.—*See* **Alcoholism.**

Infant and Invalid Feeding.—Pasteurised Milk, Dried Milk, Foods A, B and C., Almata, Herogen, Puly, Calcii Glyceroph. c. Lacte exsicc., Peptonising Powder for humanising milk and Peptonised Milk, Trilactine Milk, Whey Powder, Lactalbumen, Glaxo, Goats' Milk, Sodium Citrate Tablets (and with Sodii Bicarb). Tablets to add to ordinary milk to increase digestibility, Koumiss, see Chapter 'Nutrimenta,' Accessory Food Factors, etc.

Inflammation.—Acetanilid, Aconite, Antimony, Belladonna, Digitalis, Gelsemium, Granules d'Aconitine, Hydrarg. Subchlorid et cum Opio, Opium, Phenazone, Quinine, Salicin, Veratrina.

Locally.—Cataplasm Salicyl Co., Glycerinum Plumbi Subacet., Iodine Ionised, Hirudo.

Influenza.—Aceto-Salicylic Acid, Aconite, Acetanilide, Actæa, Æth. Nit. Spt., Ammon. Acet. Liq., Ammoniæ Aromat. Spt., Antimonii Tartras, Aspriodine, Belladonna, Camphor, Cinnamates, Cocain. Hydroch. Liquor, Colloidal Metals, Elix. Cinchonidine, Formates, Gelsemium, Hexamine intrav., Hydr. Perchlor. intrav., Ipecac. Co. Pulv., Iodi Tinct., Injection Strych-Arsen. Iod. and Quin., Inhalations of Eucalypti Ol. Menthol, *e.g.*, Ozonic Inhaler (clears the head), Magisal, Manganese Butyrate, Musk for herart failure, Menthol and Camphor, Opium and Morphine preps., Phenacetinum, Quinine preps., Phenyl-Sedasprin, Salicinum (large doses), Salipyrin, Salol, Sedasprin, Sod. Bicarb., Sod. Nucleinate Intram. Inj., Sodii Salicylas, Tinct. Quinin.

Ammon., Tab. Ammon. Quinine Comp., Influenza B. Vaccine, also Comb. Cold Vaccine, and Sensitised Infl. B. Vaccine, Tycalsin, Tyllithin.

Blood Transfusion.

For *sweating of*—Amyl Nit. $\frac{1}{30}$ minim doses internally.

For post influenzal cough, *Lysol Inhalation*, Mist. Apomorph. Co.

For an ordinary severe case give Aspirin and Dover's Powder, *aa.* 10 grains, as early as possible after customary aperient, and repeat in 6 to 8 hours; follow by a simple diaphoretic. For *headache*, if necessary, Phenacetin 5 grains with Caffeine 2 grains. For *foul tongue* Sodium Bicarbonate and Sodium Sulpho-carbolate. For *vomiting* reduce feeds and give Tinct. Iodi 1 m. hourly for 6 doses. For *cough*, Syr. Cocillanæ Co., Syr. Codein, or Linctus Terpin et Heroin. For *sleeplessness*, Bromide or Paraldehyde.—Sir Thos. Horder, L. ii./18,694,871. See also B.M.J. ii./19,695.

Influenzal Septicæmia, essential feature *B. influenzæ* with *S. pyogenes longus* or a *diplo streptococcus* as secondary organism. The latter plays a rôle in the fatal cases.—A. Abrahams, N. Hallows, and H. French, L. i./19,1 *et seq.*

Apparent immunity from Influenza at Christ's Hospital School.—Results of Inoculation. Only one case of Influenza occurred in 633 boys treated.—G. E. Friend, L. i./19,105.

Formalin Spray, 6 drachms of 40% solution to 1¾ pints of water checked Influenza.—A. Wylie, L. i./19,256.

Cinnamon Oil and Formalin destroy or inhibit growth of *B. Influenza.*—F. T. Marchant, L. i./19,392.

Pituitary Extract for bronchial congestion with cyanosis and dilatation of the right side of the heart. Tones the heart and bronchial muscles or relaxes them if there is spasm.—W. Crofton, B.M.J. i./19,240.

The following formula was useful in the 1918 epidemic. Quinine Hydrochloride, Monobromated Camphor, Hexamine of each 2 grains, Methylene Blue 1 grain in one capsule; one at onset followed by another in 4 hours: not more than 4 in 24 hours—most cases require but 3. No heart depressants used.—J. H. Hurst, L. i./27,412.

Loss of smell following influenza. Give a long continued course of Strychnine.

Influenzal pneumonia. *Hydrogen Peroxide* transfusion 2 ozs. of '10 vol.' in 8 ozs. of Normal Saline. Gas embolism is not produced. Anoxæmia often markedly benefited. Toxæmia overcome in many cases.—T. H. Oliver & D. V. Murphy, L. i./20,462.

Tinct. Iodi B.P., 20 to 30 m. diluted with 9 Cc. of Normal Saline intravenously tolerated and effect seen in 24 hours. Dense albuminuria in one case cleared up two days after first dose.—D. M. Baillie, L. i./19,423.

A gargle of *Chloral Hydrate* 2% every half-hour has been suggested. First Calomel 4 grains followed in 3 hours with ½ oz. Magnesium Sulphate.

Blindness as a sequela of Influenza. Recovery.—S. E. Denyer, B.M.J. i./22,223.

Ammoniated Tincture of Quinine 20 minims, Sodium Salicylate 10 grains, Glycerin ½ drachm, water to 1 ounce—forms a clear mixture. Possibly a Quinine-Sodium Salicylate formed soluble in the Ammonia.—N. M. Falkiner, B.M.J. i./23,958.

Influenzal Pneumonia.

Give enema of white soap and water, followed by irrigation of colon with 10 grains of Quinine Urea Hydrochloride in a pint of water—to be retained, and continued daily for several days. For the specific treatment Huntoon's pneumococcus antibody solution is used: this is a modified antipneumococcus serum containing protective substances against pneumococcus Types I, II, and III, and has the advantage of being polyvalent, is practically free from horse protein, and is easily absorbed. Inject deeply subcutaneously into the fatty tissue in the lumbar region, as closely as possible to the peritoneum 20 Cc. for an adult, the solution being previously heated to blood heat. The injection may be repeated within 10 hours and thereafter every 10 hours, 3 or 4 doses being usually sufficient. It may also be given intravenously. Leucocytosis increases both locally and generally. In all cases Sodium Oleate, 4 grains thrice daily, is given. In desperate cases Optochin Base in pill form combined with the injections is invaluable, and in cases in a state of collapse 'Cardiazol' hypodermically produced rapid effect. Notes on a series of 11 cases at a boys' college: all recovered.—A. Cowan Guthrie, Med. World, Nov. 25/27,287-297.

See also PNEUMONIA.

Insanity.—Fresh Brain Extract has been tried. *See also Mania.*

Insect Bites, ***vide*** **Bites and Stings,** also PARASITES and PEDICULOSIS.

Insomnia.—Acetanilide, Ammon. Bromid., Amyleni Hydras. Antifebrin, Bromal Hydras, Bromidia, Bromoprotein, Butyl Chloral, Camphor, Cannabis Indica and Cannabin, Chloralamide, Chloralose, Chloretone, Chlorobrom, Coca, Codeina, Codeonal, Diallyl-barbituric Acid, Diamorphine, Enema Sedativum (post operation), Guttæ Castorei Comp., Hyoscyamine, Lactucarium, Liquor Bromo-Chloral Comp., Lupuiln, Morphine, Narcophine, Nitroglycerin Tabellæ, Opium, Paraldehyde (*intravenously*), Phenazone, Phenyl-Sedasprin, Pituitary Extract (?), Potassii Bromid., Quinine at bedtime, Scopolaminæ Hydrobromid., Sedasprin, Sedeff, Sodii Bromid., Soneryl, Stramonium, Strychnina and its salts, Sulphonal, Thyroid and Manganese, Trional, Urethane, Valerian, Veronal, and Veronal Sodium.

Opium should never be employed as hypnotic and the bromides of little use. Paraldehyde best mere 'nightcap' in mild cases (heroic doses are mentioned, ½ oz. on occasion every four hours); useful for quick action. Sulphonal apparently safe up to at least a drachm a day divided. Hyoscine is the strongest in emergency, and is safe up to 1/50th and probably up to 1/33rd grain hypodermically, *e.g.*, in acute delirious mania.—F. Wyatt Smith, Pr., Sept., 1921.

Sleep and Sleeplessness.—Chloralamide, Veronal, Luminal and Paraldehyde mentioned.—W. Johnson Smyth, B.M.J. i./23,226.

Discussion on treatment. A large number of hypnotics and analgesics are referred to.—R. Hutchinson, B.M.J. ii./25,775.

Intertrigo. *Locally.—Acid Boric. and Ung., Acid. Tannic Glycerin., Bismuth Ointment, Calaminæ Lotio, Calcii Carb., Calcis Aqua, Camphor, 'Cremor Sicc., preps., Formosyl, Formosyl Cream, French Chalk, Fuller's Earth, Hazel Foam, Iodi Tinct.* diluted with 3 times volume with *Eau de Paris, Iodine Colloidal, Liquor Carbonis Detergens* diluted with equal vol. or twice volumes of Eau de Paris or Ichthyol diluted with water 50 or 60 times, *Kaolin, Methylene blue, Oleogen Compounds, Pellanthum preps., Perfumed Formosyls, Scarlet Ung., Ung. Thorii Oleat, Vaseline, Zinci Cremor and Ung., Zinci Oleat Pulv., Zinc Salicylas.*

Intestinal Antiseptics.—*See* **Antiseptics.**

Intestinal Worms.—*See* **Worms.**

Iodism.—Acid Sulphanilic. Preps. containing ammonia.

Iritis.— **Find out cause.**—Colchicum, Hydrarg. Perchlorid., and Subchlorid., Iodum, Oil of Gaultheria, Potass. Iod., Pilocarpine, Tylcalsin intrav.

Locally.—Atropina Ung., Atropinæ Sulph. Guttæ and Lamellæ, Belladonna, Duboisine, Dionine Scopolamine.

Itch.—*See* **Scabies.**

Jaundice.—Acid. Nitro-Hydroch. Dil., Aloes, Ammon. Chlorid., Benzoates, Elixir Gentianæ Acidum, Calcii Chlorid., Cinchophen (of new born), Euonymin, Ferri Succinas, Hydrarg. cum Creta, Hydrarg. Subchlor., Hydrastis, Iodoform, Iridin, Manganese Sulphate, Pilocarpine, Podophyllin, Salol, Sennæ Co. Mist., Sodii Phosphas and Sodii Phosph. Efferves., Sodii Salicylas, Sodii Succinas, Sodii Sulph., and Sodii Phosph. Efferves., Taraxacum, Contramine for Salvarsan jaundice.

To relieve skin irritation dilute Nitric Acid Lotion or Sodium Bicarbonate Solution, Hazel Foam, Liquor Carbonis., Ung. Rusci. Comp., Formosyl Cream.

Diagnosis of, *v.* Bile in Urine, Vol. II.

JAUNDICE, INFECTIVE. *See* Vol. II.

Jaundice, Epidemic of Campaigns, and of Tetrachlorethane poisoning. In the former avoid excess of protein. Give in a mixture Sodium Bicarbonate 20 grains, Potassium Citrate 30 grains, Sodium Sulphate 30 grains, thrice daily. Calomel should not be given in repeated doses. Treatment in the latter varies as the case is (1) early (pre-jaundice), or (2) with marked toxæmia, or (3) not marked.—Sir W. H. Willcox, B.M.J. i./16,297. *See also* L. i./19,869,929 and ii./19,419.

Grave familial jaundice. The prognosis for infants' life is bad. It is thought to be due to fœtal toxæmia of maternal origin. Prophylaxis should consist in care of the mother's diet and administration of intestinal and biliary antiseptics, *e.g.*, Hexamine, Sodium Salicylate, minute doses (1/20th grain) of Calomel, Naphthalene Tetrachloride, Salol, Guaiacol. Ballantyne recommends Calcium Chloride. The infant should have Calomel in small doses.—Sir H. Rolleston, Pr., Jan., 1920. See also A. P. Agnew, Pr., Sept., 1920, p. 217.

Epidemic catarrhal jaundice. M. Health Rep. on outbreak.—B.M.J. ii./27,108.

The risk of hæmorrhage in operations to be anticipated by Calc. Chloride 10% 5 Cc. intrav. for three days.—W. E. M. Mitchell, L. ii./27,270.

Kala Azar.—Organic Arsenic Comps. *q.v.*, Antimony Oxide, also Antimony Pot. or Sod. Tart. Injection. Fourneau '309' and Bayer '205 have been reported on. Urea Stibamine.

Pathology and transmission.—L. i./22,400 ; ii./22,1138.

Endemic in Assam, where it occasionally becomes epidemic. After being long quiescent, the disease became active again in 1917.—B.M.J. i./23,430.

Treatment of kala-azar.—L. Napier, I.M.G., Nov., '25,533.

Iodine by mouth and intravenously gave good results. Forty minims of the following solution given : Iodine 6 grains, Potassium Iodine 6 grains, Distilled Water 1 ounce. Injected intravenously every other day up to 5 injections, and then 10 drops of Tincture of Iodine by mouth thrice daily for a week.—Brachio, I.M.G., July, 1923, C.D., Feb. 23/24,259.

"Kala-Azar" (Oxford Univ. Press), by L. E. Napier, deals with epidemiology, etiology, pathology, symptomatology, diagnosis and treatment. Cure rate with the newer Antimony compounds now 95%.—B.M.J. i./28,1069.

Keratitis Interstitial.—At Massachusetts Hospital results were decidedly in favour of antisyphilitic treatment.—L. ii./25,764.

Kidney Permeability Tests.—Methylene Blue, Indigo-Carmine, Phenol-sulphone-phthalein, Phloridzin, *vide* Vol. II.

Thorium-Sodium Citrate as pyelographic medium.

Renal disease—diagnosis.—H. MacLean, L. i./25,1213.

Estimation of non-protein nitrogen of the blood, urea concentration, blood urea, etc., in renal disease.—Prof. Maclean, B.M.J. ii./22,1067. See *Vol. II.*

Keloid.—Formalin Injection, Mist. Hydr. Biniodid., *Radium, 'X' Rays.*

Labour.—*See* Uterus, to Contract.

Laryngismus Stridulus.—Aconite, Amyl Nitris, Belladonna, Bromides, Chloral, Coninæ Hydrobrom., Emetine, Gelsemium, Piscidia.

Laryngeal Ulcers. *Locally.—Lactic Acid, also Quinine HCl. Acid, as pigment and nebula.*

Laryngitis.—*Find out cause.* Aconiti Tinct. or Pastil., Ammon. Acetat. Liq. and Ammon. Chlorid., Antimonials, Antipyretics, Calomel, Codeine Jelly, Creosote, Cubebs, Diacetyl and Ethyl Morphine, Glycaphorm, Iodoprotein, Linctus (various), Lichenoids, Phenyl-Aspriodine, Pulsatilla, Terebene.

Locally.—Counter-irritation, fomentations, leeches.—Adrenalin, Inhalations of Ammon. Chlorid., Sprays of Creosote, 'Menthol in Oil,' Thymol, Tinct. Benzoin Co., Belladonna and Conium, Juniper, Æther Acetic, Insufflatio Morphinæ et Bismuth and of Catechu, or Menthol, or Tannin, Oxygen and Alcohol Inhalation, Pastils of Glyco-gelatin, e.g., of Ammon. Brom., Pigments of Cocaine, Menthol, &c.

Leishmania Affections.—Antimony injections and Arsenicals.

Local leishmaniasis (Delhi sores etc.) well treated by scraping and lightly applying solid KOH and dressing.—E. J. E. Risk, B.M.J. i./21,267.

Iodobismuthate of Quinine *per os*, with Emetine intravenously, caused rapid amelioration in American Leishmaniasis.—per Jl. Trop. Med., Mar. 15/26,98.

Leprosy (see also *Vol. II.*).—Antimony Colloidal, Chaulmoogra preps. *Guaiacol internally and locally*, Sodium Morrhuate injected, Sodium Chaulmoograte 'A' (Pills, and 'C' Sterules, Cupri Cit. Hydnocarpates).

Suggestion that added Calcium should be supplied in the food.—F. P. Underhill and Co-workers, T.D.B., Vol. 17/21,273.

The treatment of Leprosy.—Sir L. Rogers, Int. Conf. Trop. Am., '24,772-790.

Vaccine made from a nodule from patient's arm used. Strength 200 mill. per Cc. Initial dose 0·1 Cc. increased. Finally 1 Cc. given.—Sir N. Walker. L. ii./24,542.

For adhesions.—Ac. Trichloracetic Paint.

There is no specific cure, but the following clears up active signs in early cases : (1) treatment of accompanying disease, (2) rectification of diet, (3) gradually increasing exercises, (4) injection of Hydnocarpus Oil and its preparations, (5) external applications, (6) surgical intervention when necessary. Vaccines intravenously are useful in certain cases and in the third stage of the disease : Hydnocarpus Oil is the most efficient treatment in the first and second stages.—E. Muir, R.S.M. Discussion, B.M.J. i./27,284 ; L. i./27,339.

Leucocythemia.—Benzol Capsules. Arsenical preparations, Cacodylates, Digitalis, Glycerophosphates, Iodine, Iodoprotein, Iron Salts, Marrubin, Phosphorus, Syrupus Iodo-Tannicus, Syrupus Tann-Iodo Phosphoratus.

Leucorrhœa.—Hæmatoxylin, Iron Salts, Manganese preps., Mineral Acids, Myrrh. Vegetable Tonics, Fæxin Ext.

Locally.—Acid. Boric. Lotio, Acid. Carbolic. Lotio, Copper, Zinc or Iodine Ionisation (for obstinate discharge), Alumen, Ammonio-Ferric Alum, Boric Acid in Powder, Formosyl Pessaries, Kaolin Insuffiation, Hydrastis, Iodates, Mercuric Chloride, Ovules of Alum or Carbolic Acid, etc., Naphthol, Pess. B. Ac. Lact., Pessus Quininæ, Potassii Permang., Quinine Hydrochloride Tampons, Tannic Acid, Sodii Bicarb. and Belladonna (Ringer), Sodii Perboras, Tannin and Alum Injection, Zinci Sulphocarb.

Strong solutions of antiseptics, *e.g.*, Thymol, Carbolic Acid, Potassium Permanganate and Lysol increase leucorrhœa, while weak solutions have no bactericidal action. Good results with 'dry cure,' *e.g.*, application of Aluminium Oxide powder or Silver Nitrate.—B.M.J.E. i./26,40.

Leukæmia, *see* **Anæmia.**

Leukoplakia.—Radium.

Lice to kill. *See* **Parasites, Animal.**

Lichen planus.—Acid Phosphoric c. Strych., Arsenicals.

Locally.—Acid. Salicyl Ung., Liq. Carbonis Deterg. 10 *m. to* 1 *dr. to oz. of water or Calam. Lotion.* See also Eczema.

Liver Abscess, *vide* Abscess, Liver.

Locomotor Ataxy.—Alum. Chlor., Arg. Nit., Arsamin, Arsenobenzol, Cannabis, Brain and Spinal Cord, Chloralamide, Colloidal Mercury and Silver, Ergot, Hexamine, Hyoscine, Inj. Ac. Nucleinic, Iodinol, Iodoprotein, Keratin, Lipiodol, Mercurialised Serum, Mercury Benz., Morphine, Morrhuæ Ol., Nitroglycerin, Pot. Brom., Pot. Iod., Quinine, Sod. Brom. Intrathecal injection, Sod. Cacodyl., Sodii Salicylas, Strychnine (with acid), 'Three Gland' and 'Four Gland' Elixir and Tablets, Thyroid and Manganese.

Locally.—Mercury Inunctions. Cataphoresis of Cocaine Solution, Radium.

Intrathecally. Salvarsanised blood from sane patient.

Lumbago.—Ammon. Chlor., Aspirin, Aspriodine, Belladonna, Camphor Monobrom, Cimicifugin, Colchicum, Elixir Acid. Salicylic. Co., Morphine, Phenazone, Phenyl-Sedasprin, Potass. Iodid., Quinine, Sedasprin, Salicylates, Seden, Tylcalsin, Tyllithin. All Purgatives, *e.g.*, Chelsea Pensioner.

Locally.—Aconite Liniment, Amyl Salicylate, Amysal, Anserine Mulls Medicated, Atropinæ Linim., Belladonnæ Linim., Capsici Linim., Chaulmoogratés, Chloroform Liniment, Heat Rays, Iodum Oleatum, Menthol Linim., Menthol Plaster, Methyl-Aspriodine, Methysal Balm, Guaiacol, Iodine and Oleogen Salicylicum, Opii Linim., Ung. Iodi Intinctum, Picis. Empl., Veratrinæ Ung., 'X' Rays. Static Electricity.

Lupus.—Ac. Nucleinic Inj., Arsenic, Cacodylates, Gynocard, Ol., Hydrargyri Biniodidum, Iodum, Morrhuæ Ol., Phosphorus, Quinine preps., Salicin, Thyroid Gland, Tuberculins.

Locally.—Acid. Chromic. (and Chromic Ions ?), Acid. Cinnamic, Acid. Hydrochloric, Acid. Lactic., Acid. Pyrogalic Emp. and Ung., Acid. Salicyl. 50% *Ung., Arsenobenzol, Bism. Oxyiodogall., Chaulmoogra preps., Sod. Morrhuate, Bismuth Iodas, 'Brass Paste' and preps., Camphora Salicylata, Carbonic Snow, Carbon Tetrachloride c. Iodine, Cicatricine, Cupri Oleas, Ethyl Chloride, Finsen Light, Formosyl, Hydrarg. Nitras, Hydrogen Peroxide, Iodine Ions, Iodoform, Lactic Ions, Lassar's Paste, Oleata, Pitchblende Ointment, Pot. Permang., Radium, Resorcin, Thiosinamin, Thymol Iodide, Tuberculin, Uranium Oxid. Ung. and Injectio, 'X' Rays, Zinc Chloridum, Zinc and other Ionisation.*

Fehling's Solution injected in lupus.—G. N. Meachin, L. i./19,528.

A case of 16½ years standing cured by prolonged ionisation treatment.—J. B. Whitfield, L. i./25,1026. Diathermic Treatment.

A treatment using Liq. Hyd. Nit. Acid, Zinc and Carbolic and Brookes' Ungt.—A. R. Somerford, L. i./28,1173.

Lupus Erythematosus. Arsenicals, Quinidine Caps. and Elix.

Locally.—Acid. Carbonic., Hydrarg. Biniodid, Finsen Lamp, Radium Ung. Thorii Oleat., 'X' Rays.

Mercuric Chloride in Spirit 1 in 240 alternately with a Zinc, Boric Acid and Bismuth Ointment.—R. Thomson, Pharmacist, Elgin, N.B.

Freezing with Carbon Dioxide and ionisation with Zinc Sulphate Solution are the most useful.—J. M. H. McLeod, Pr., April, 22/236.

An autogenous Strepto. Vaccine made from the excised tonsils of a patient was curative.—H. Barber, L. i./22,366.

Lupus leishmaniasis. A leishmaniasis of the skin resembling lupus vulgaris hitherto unclassified. History of case.—J. B. Christopherson, Jl. Trop. Med., June 1/23,203. Antimony Tartrate intrav.

Lymphangitis. Manganese Butyrate.

Lymphangitis, obstructive, treated by Potassium Iodide in conjunction with Potassium Acetate, the application of hot fomentations and complete rest.—Sebastian L. Rodrigues, 'The Antiseptic,' (Madras), Dec./22.

Lymphadenoma.—Arsenic, 'X' Rays. Coll. Manganese has been used.

The co-existence of Hodgkin's disease and amœbiasis. *E. dysenteriæ* and *Councilmania* found in stools.—A. Kofoid, O. Swezy & L. M. Boyers, Jl. A.M.A., Feb. 18/22,532. Also in inguinal gland.—*ibid.* Apl. 15/22,1147. Suggested Hodgkin's disease is amœbiasis of lymphatic glands. In 17,000 examinations of 7,000 persons there was a monthly average of 16·5% showing infection with *E. dysenteriæ.* Amœbiasis endemic in U.S.—*ibid.* Proc. N.Y. Path. Soc., N.S., Jan.-May, '22.

Liberal doses of Neokharsivan intravenously, in conjunction with 'X' Rays.—Sir T. Horder, L. i./25,337.

Malaria.—Ammon. Picrate, Antim. Ox. injn., Arsenicals, Arsamin, Arsenobenzol, Cichona Febrifuge, Cinchonidine Sulph., Cinchonine Acid HCl., Cinchonine Injections, Eucalyptus Oil, Elix. Berberine, Inj. Strych. Arsen. Iodid. and Quin., Mannitol-Quinine, Methylene Blue, Old English Fever Pdr., Pulvis Quinin. Comp., Quinin. Sulph., Quinidine, Quinine and Quinidine Periodides, Quinine base (for children, also in preference to a salt when there is hæmoglobinuria), Giemsa's injs., Phosphorated Oil, Quin. Hydrobrom. injections, Quin. HCl. internally in preference to Sulph., Salicin, Salicylates, Sodii Citras and Acetates and Tartrates *see* Sod. Cit., p. 29, 774, Steriloid Quinine and Quinidine, Tylcalsin, Tyllithin, Tylmarin, Urea.

Rusot (q.v.) good results in Chronic Malarial Fever of children with hepatic derangement. Warburg's Tincture rarely used in India now.—Ghosh.

Malarial Relapses.—Bold injection treatment with Quinine Acid Hydrochloride combined with Mist. Anticachexia 1 and 2. *See* p. 747.

Care and Treatment of Cases.—Sir Ronald Ross, L. i./19,780.

Malaria, black water fever, dysentery, influenza, typhoid, typhus and sand fly fever in Macedonia in the war.—A. G. Phear, L. ii./20,56.

Neosalvarsan combined with Quinine in the treatment of chronic and relapsing malaria has been well spoken of.—B.M.J. i./24,918.

As an attack of dengue apparently confers immunity experiments with a serum from blood of persons recovering from dengue has been used, 3 doses of 1 Cc. intramuscularly at intervals of 7 days.—R. E. Ingram-Johnson, Jl. Trop. Med., Mar., 16/25,126.

Pregnancy complicated by malaria.—Quinine, see p. 748.

MALARIAL COMA.—Quinine-Urethane intravenously, *q.v.*

Malignant Pustule.—*See* **Anthrax.**

Malignant Tumours.—*See* **Cancer.**

Malta Fever.—*See* **Mediterranean Fever.**

Mammary Abscess.—*See* **Breast, Inflammation of.**

Mania.—Apomorphine, Atropine, Bromides, Cannabis Indica, Chloralamide, Chloral Hydras, Chloroform, Conine, Diacetyl and Ethyl Morphine, Digitalis, Gelsemina, Hyoscine salts, Hyoscyamine, Malourea, Morphine preps., Opium preps., Paraldehyde, Sedasprin, Syr. Pot. Brom. et Pilocarpin, Sulphonal, Thyroid Gland, Trional.

Marasmus.—Arsenical preps., Conf. Glyceroph. Co., etc. Elix. Hæmoglobin, Emuls. Ol. Morrhuæ c. Lecithin, Lecithin, Iron preps., Maltaffin, Meat preparations, Milk and Glycerophosphates, Marrubin, Radiostol preps., Thymus.

Infantile: Sod. Taurocholas and Glycocholas *q.v.*

Infantile marasmus well treated with banana pulp in milk. A steady increase in weight.—B.M.J.E. i./27,68.

Measles.—Aconite, and Pastil of, Æther Nit. Spt., Ammon. Acet. Liq. Ammon. Carb., Belladonna Tincture, Calc. Sulphid., Cinnamon Powder for prophylaxis, (German measles) Ipecacuanha, Nuclein inj., Potass. Tart. Acidus.

Ol. Eucalypt all over the body; Carbolic Oil 10% to the tonsils and pharynx.

Diazo-reaction in urine. Histidine is responsible for 85% of the colour. In measles the output of it is increased.—G. Hunter, B.M.J. ii./22,751.

Aspirin, Phenacetin and Dover's Pdr. combined. Tablets are made.

Convalescent Serum in Measles.—Injection of 6 Cc. into a child under 2 years of age, and 10 Cc. for child over that age, generally sufficient to prevent infection, or at any rate to render attack very mild. Prompt use prevents outbreaks in institutions and among troops. Gives immunity for one month only, but modified cases have lasting immunity.—W. H. Park, Int. Conf. Trop. Am., '24,910. The malady is not aborted, but incubation period increased and disease rendered very mild. Immunity lasts for 4½ months. —A. N. Kingsbury, L. i./27,7.

Mediterranean Fever.—Intestinal Disinfectants, *e.g.*, Benzonaphthol, Salol, Hexamine, Trilactine, Vesalvine 'S', etc. Boil the milk. *M. Melitensis* Vaccine. Dried Yeast for peripheral neuritis of.

Melancholia.—Bile Salts, Bromides, Brominol, Camphora, Catha Milk and Glyceroph. Coca and Cocaine, Cannabis and Cannabin Tannas, Damiana, Elixir Gentianæ Acidum, Elix. and Emulsio Lecithin, Musk, Nitroglycerin Tabellæ, Nux Vomica, Ol. Elliott Caps., Opium Tinct., Phosphorus, Pil. Potentin Co., Pituitary Gld. Entire, Syr. Glyceroph. Co., Syr. Neurotonique, Tabellæ Erythrol Nitrate, Valerianates.

Menière's Disease.—Acid. Salicylic., Bromides, Caffeine, Gelsemium, Pelletierine.

Meningitis.—*Discover cause* and treat according—*e.g.* if C.S. Antimeningo. Serum, Belladonna, Calomel, Hexamine (?), Iodides, Opium, Veratrum. Lumbar puncture, Antiseptic Injections, Mercurial Injections. Colloidal Metals, *e.g.*, Platinum in some forms of.

Meningitis, Basic.—*Iodoform Ungt. inunction to back of neck.*

Menopause.—Caulophyllum, Viburnum, Hydrastis, Ovarian Substance and Corpora Lutea desiccated.

Menorrhagia.—Acid. Sclerotic., Acid. Sulph. Dil., Amyl Nit., Beberinæ Sulphas, Bromides, Brucea Sem., Calc. Chlorid., Cannabin, Cotarnine Phthalate, Digitalis, Elixir Ergotæ cum Ferro, Ergot, Erigeron Oil, Erodium Cicutarium, Ferro-Alumen, Hamamelis (see note *infra*), Hydrastis, Iron Persalts, Lecithin Elix. and Emuls., Monsel's Solution, Mammary Gld., Ovar. Gld., Pituitary Gland, Dry (entire gland), Plumbi Acetas, Sodii Citras, Thyroid, Viburnum, Zinc Ions.

For severe menorrhagia Tinct. Hamamelidis in small doses does no good, but 1 drachm every 2 hours up to 4 ounces in the period are effectual.—W.W.W.

Migraine.—See **Headache, Nervous.**

Milk, to Increase Flow.—Acid. Lactic., Galega (Goat's Rue), Ext. Gossypii Pulv., Jaborandi, Malti Ext., Meat Extracts, Marrubin, Pineal Extract (?), Pituitary Extract (?), *q.v.*, Potass Cit., Thyroid Gland.

During lactation, as soon as milk engorgement shows itself, give Potassium Citrate 15 grains, Ammonium Carbonate 3 grains, Chloroform Water 2 drachms, water to one ounce, four-hourly. The Ammonium Carbonate assists in keeping the blood alkaline.—R. Larkin, B.M.J., i./17,765.

Milk, to arrest Flow.—Agaricus albus and Agaricin.

Locally. Belladonna is generally thought useful.

Drugs excreted by the milk which hence affect the child.—Anise Oil, Dill Oil, Garlic, Turpentine, Copaiba Oil (and probably all volatile oils), Sulphur, Rhubarb, Senna, Jalap, Scammony, Castor Oil, Opium, Iodine, Antimony, Arsenic, Bismuth, Iron, Lead, Mercury, Potassium Iodide. These must be given with care. Copaiba or Turpentine will make the milk so nasty that the child will not take it. The purgatives may cause diarrhœa in the child. Opium should not be given in large doses to the mother. On the other hand, Mercury, Arsenic and Potassium Iodide may be given to the child by being given to the mother.—H.W. See also Arsenobenzol, p. 201.

Moles.—*Liquid air, Caustics. Liq. Sodii Ethylatis.*

Hairy Moles.—Treatment should be Electrolysis followed by freezing. Radium, 'X' Rays, cautery, and chemical caustics not advised.—H. C. Semon, L. i./25,1360.

Morphine Habit.—Berberine, Camphor, Cocaina, Codeine in 'Withdrawal, Coll. Gold, Dionin, Emetine, Heroin, Hyoscina, Mist. Belladonnæ, Xanthoxyli and Hyoscyami, Nitroglycerin, Nux Vomica, Sodii Bicarb., Sodii Bromidum, Sparteinæ Sulphas, Trional.

Mosquitoes, to ward off.—See **Bites and Stings.**

Mumps.—See **Parotitis.**

Myalgia (Muscular Rheumatism).—Actæa, Ammon. Chlorid., Aspriodine, Atropinæ inj. hypod., Elixir Calcii Chlorid., Calcii Lactat., Ibogaine, Iron Salts, Morphinæ inj., Pot. Iodid., Salicylates, Sedeti.

Locally.—Anserine Mulls medicated, Belladonnæ Glycerin and Linim. Capsici Empl. and Linim., Camphor Liniment and Compound, Clove Oil, Ether Spray, Iodi Linim., Menthol, Methyl-Aspriodine, Methysal Balm, Veratrinæ Ung.—See also LUMBAGO.

Myasthenia Gravis.—Lecithin, Electricity.

Myxœdema.—Arsenic, Iron Salts, Nitroglycerin. Pilocarpine, Spleen Substance, Strychnine preps., 'Three Gland' and 'Four Gland' Elixir and Tablets, Thyroid and Manganese, Thyroid preps.

Sir J. Cantlie attributed puffiness in various parts of the body in women to the open chest clothing so much in vogue. He had excellent results from Four Gland Tablets. Puffiness cured and depression removed.

Thyroid in myxœdema must be given with exactness. Divide therapy into (1) dose to restore patient to normal B.M.R., (2) the dose needed to maintain. In average adult 0·13 Gm. of dried gland thrice daily can be given. Keep patient in bed at least a week and continue until B.M.R. is between -10 and -5. The maintenance dose is usually about 0·13 Gm. per day, and this must be continued throughout life. Patient must co-operate. If complications are present he should be kept in bed and Thyroid given in very small amounts. If heart is involved, Digitalis and rest before treatment; if anæmic, transfusion should be considered; if chronic nephritis exists the dose should be kept small, diet reduced in protein and constant watch kept of blood urea nitrogen.—C. C. Sturgis and W. B. Whiting, Jl. A.M.A., ii./25,2013-17.

Nasal Catarrh.—See **Catarrh, Nasal.**

Nævi. *Locally.—Acid Carbonic, Acid. Chromic., Acid. Nitric., 'X' rays Collodium, Sodii Ethylas, Zinci Chlorid. Iodid. and Nitras.*

Liquid Air. High Frequency Current

Nephritis.—*Treat according to the cause.* Aconite, Alkalis, Basham's Mixture, Buchu, Calcii Chlorid., Copaiba, Digitalis with Caffeine, Erythrol Nitrate, Gokhru, Haustus Imperialis, Herdei Dec., Hydrastis, Iodo-Caffeine, Iodo-Theobromine, Koumiss, Pot. Nitris., Pot. Iod., Pulv. Potass. Nitrit Co. (Brunton), Salt free diet, Santali Oil, Scoparius, Sod. Salicyl., Strophanthus, Theobromine Aceto-Salicyl., Thyroid, Triticum Repens, Urea, Uva Ursi. Saline Solution injected may prolong life. B. Coli Vaccine (of pregnancy).

Alkaline Salts.—Acetates, Tartrates, Citrates and Bicarbonates of Sodium, Potassium and Ammonia probably act on the renal epithelium. The slight excess of saline constituents thus produced in the blood stimulates the renal epithelium to excrete them. They draw with them a certain amount of water and the flow is increased. *Cardiac Tonics.*—Digitalis acts directly on heart muscle and arteries and increases flow of urine by quickening flow of the blood through the kidney,—especially useful where blood pressure is low or the heart failing before resistance too high for it. *Caffeine, Theobromine and allied drugs.*—These stimulate both heart and renal cells. Theobromine-Sodium Salicylate is more potent than Caffeine. Where condition of the kidneys is the main cause begin with Alkaline Salts.—Herringham.

Acute nephritis in childhood. Diuretics are probably harmful and should never be used. In uræmia, Magnesium Sulphate intravenously is of undoubted value.—L. G. Parsons, B.M.J. ii./26,367.

Interstitial nephritis.—Generous milk diet, green vegetables and fresh fruits, restrict animal proteins and limit carbohydrate intake. Prohibit artificially-sweetened puddings, etc.—W. E. Deeks, Diet and Disease, 1927.

Nervous Debility, Nervousness.—Acid. Hydrobromic., Acid Phosph., Dil., Arsamin, and other Arsenic preps., Asafetida, Atropine Methyl Bromide, Atropine Valerianate, Antiseptics, *e.g.*, Calomel, Bisciniod, Bromides, Brominol, Calcii Glycerophosph. (et cum Lact. Exsiec.), Camphora, Cannabis, Indica, Capsul. Valerian. Comp., Catha Milk and Glyceroph., Coca Wine, Droitwich Baths, Easton's Syrup, Emuls. Ol. Morrh. c. Lecithin, Ferri Glycerophosphas, Ferric Salts, Guttæ Castorei Co., Hæmoglobin Capsules, etc., Hypophosphites, Ibogaine, Ignatiæ Tinct., Lavand. Co. Tinct., Lecithin (Elix. and Emulsio.), Liquor Auri et Arsenii Bromidi, Liquor Auri et Hydrarg. Brom., Liq. Antihystericus, Liq. Ferri Mang. Pept. c. Hæmoglobin, Liq. Iodo-Ferri Pept., Liq. Testicularis, Magisal, Marrubin, Ol. Allii Essent., Ol. Morrhuæ, Omnevit, Ovarian Subs., Pil. Potentin Co., Phosphorus, Quinine preps., Salicin, Sedasprin, Syrup Kolæ Comp., Sodii Phosph., Spt. Meliss. Comp., Strychnine, Sumbul, Sirop Neurotonique, Suprarenal Gland, 'Three Gland' and 'Four Gland' Elixir and Tablets, Theobromine-Lithium Benzoate, Thyroid (and with Manganese), Trilactine, Urea Bromine, Valerian preps., Vanadates, Veronal.

Neuralgia, ***Discover cause.***—Acetanilide, Aconite, Actæa, Æther (injected), Alcohol injections, Ammon. Carb., Ammon. Chlorid., Arsenic, Aspirin, Atropine Valerianate and Salicylate, Belladonna, Bromides, Butyl Chloral, Caffeine, Cannabis, Chloral-Hydras, Cibalgin, Cinchonine, Cinchonidinæ Sulph., Colchicine, Conium and Coninæ Hydrobromid., Elixir Antineuralgic, Elix. Caffeine, Elixir Gentian Acid., Exalgin, Gelsemium preps., Hyoscyamine, Iron Salts, Lecithin Elix. and Emuls., Liquor Bromo-Chloral Comp., Magisal, Methylene Blue, Neuralgic Pills, Neuralgia Powders, Nitroglycerin, Phenacetin, Phenazone, Phosphorus, Pil. Butyl Chloral c. Camph. et Gelsem., Pil. Potentin Co., Pulv. Morphin. Eff., Quinine preps., Quin. Urea Inj. (acute facial), Salicylates and Salol, Sedasprin, Sedeff, Syr. Glyceroph. Co., Syr. Hypoph. Co., Syr. Pilocarpin. et Potass. Brom., Thyroid and Manganese, Tylcalsin, Tyllithin, Urea-Bromine.

Locally.—Æthyl Chlorid., Aconiti Linim., Aconitinæ Ung., Bellad. Collod. et Tinct. Ætherea, Linim. and cum Chloroform, Chloral Hydras cum Camphor and cum Menthol, Chloroform, Ung. Iodi Intinctum, Menthol Linim., Methyl-Aspriodine, Methysal Balm, Morphinæ Oleat., Oleanodyne, Quinine Ionised, Radium, Salicylic Ions, Thorium, Veratrinæ Ung.,

Neuralgias of the head and neck—dental, antral abscess, paroxysmal trigeminal, supra-orbital, post-herpetic frontal neuralgia, migrainous, occipitonuchal neuralgia and psychalgia considered.—Wilfred Harris, L. i./23,150.

Nocturnal trigeminal neuralgia promptly cured by non-toxic diet, supplemented by a glass at each meal of a solution of Sodium Sulphate 10 Gm., Sodium Phosphate 5 Gm., Sodium Bicarbonate 5 Gm., in a litre of water.—Per Jl. A.M.A. ii./25,2058.

Neuritis, ***Discover Cause.***—Arsenical preps., Aspirin, Iodides, Mercurials, Salicylates, Sedatives—Nitroglycerin, Phenazone, Static Electricity, Interrupted current.

Locally.—Hydrochloric Acid (q.v.).

Multiple neuritis. External poisons, *e.g.*, CS_2 used for sticking rubber soles to boots, autotoxæmias, infections, cachectic conditions responsible for. —Wilfred Harris, L. ii./22,849.

Causation and symptomatology of multiple neuritis, alcoholic neuritis, Lead and Arsenical neuritis. Diabetes, beri-beri, diphtheria and other infections associated with.—T. Grainger Stewart, B.M.J. ii./25,461.

Neuritis, Retrobulbar.—Retinal Extract.

Neurasthenia.—*See* **Nervous Debility.**

Night Sweats.—Acid. Camphoric., Atropine and inj. hypod., Atropine Methyl Bromide, Belladonna, Coto and Cotoin, Guaiacol Carb., Elix. Quinindine, Hyoscinæ, H. Br., Iron Salts, Picrotoxin, Quinine preps., Strychnine.

Nipples, Fissures of, and Sore.—*See* **Fissures of Nipples.**

Nits.—*See* **Parasites, Animal**

Nocturnal Emissions.—*See* **Incontinence.**

Nose Bleeding.—*See* **Epistaxis.**

Nymphomania and Satyriasis.—Bromides, Camphor, Conium, Hyoscine.

Nystagmus.—Formic Acid.

Obesity.—Alkalis and Alkaline Carbonates, Belladonna, Bromides, Fucus, Iodinol, Iodoprotein Tabs., Iodum, Potassii Iodidum, Saccharin instead of sugar, Sodii Mag. Sulph. Efferves., Thyroid. Aperient Waters.

Exogenous obesity.—Most cases respond to diet and exercise. The use of Thyroid is seldom necessary or advisable.

Endogenous obesity.—Distinguished by the fact that B.M.R. and tolerance for sugar are usually abnormal. When of Thyroid origin, the gland acts as a specific, ½ grain daily should be increased gradually until patient loses 1 to 2 lbs. a week—even 15 grains a day may be required. In obesity of Pituitary origin, the fat distribution is characteristic, especially marked round the girdles, and is commonly found in children and adolescents, usually accompanied by disturbances of growth and genital function. The best results can be obtained by a mixture of ***Thyroid and whole-gland Pituitary,*** ½ grain of each daily, increasing until patient loses 1 to 2 lbs. a week. This mixture is also of value in obesity following childbirth, or at the menopause when diet and exercise are ineffective.—H. Gardiner-Hill, L. i/25,740, ii./25,1035. *See also* J. L. Masterman-Wood, Pr., Sept., '27,165, and our page 990.

Carbohydrate tolerance in obesity.—R. S. Allison, L. i./27, 537.

Ocular Pain. *See* **Eye.**

Œdema.—Calcii Lactas (of feet), Calcii Chlorid., Theophylline Sodium Acetate.

Locally.—Cataplasm Salicyl. Co., Antiphlogistine, Lin. Pot. Iodid. cum Sapone, Mag. Sulph. Solution, Perfumed Formosyls, Ung. Hydrarg. Co. (of Ankles).

Milk freed from Sodium Chloride and Potassium Chloride of value in the treatment of œdema. A small quantity of Lactose is added and the milk sterilised.—Bull, de l'Acad. de Med., Nov. 3/25, per Jl. A.M.A. ii./25,1997.

Œdema, Angioneurotic.—Post-Pit. gland *per os* and inj., Thyroid, B. Coli Vaccine autogenous.

Acute suffocating pulmonary œdema. Cases treated by Pituitary Extract Atropine, Digitalin, Amyl Nitrite and Antimony Tartrate injections.—B.M.J. i./26,696.

Ophthalmia.—*See* **Conjunctivitis.**

Ophthalmia Tarsi. *Locally.—Acid. Boric. Lotio and Ung., Glyc. Plumbi Subacet. Ung., Copper Sulphate, Hyd. Oc. Flav. Ung., Iodoform Ung. Sphagnol.*

Optic Atrophy, various types of. One group is that associated with toxic neuritis (commonly called retrobulbar), in which damage is done directly to the neurone itself. A large group of substances gives rise to the disease called toxic amblyopia ': Methyl Alcohol, Tobacco, Ethyl Alcohol, Quinine, Lead, Carbon Bisulphide and Arylarsonates.—R. E. Wright, B.M.J. i./23,806.

Orchitis.—Acetanilide, Aconite, Antimonials, Iodoprotein Tabs., Pot. Iod.; Saline aperients.

Locally.—Belladonna Glyc. et Ung., Guaiacol, Iodi Tinct., Oleosa and Ung., Mag. Sulph. Solution, Mercurial Plaster, Mercurome (?).

Oriental Sore.—Carbon Dioxide Snow. Emetine Injection, Organic Antimony and Arsenic, Phosphorated Oil (Castellani).

Very striking results with Emetine Hydrochloride.—Jl. Trop. Med., Sept. 15/24,251.

Osteomalacia.—Parathyroid, Phosphorated Oil.

Osteomyelitis.—B.I.P.P.

Otitis and Otorrhæa.—Aconite, Antimonials, Aurinaria, Iodides, Saline aperients, Pneumococcal Vaccine.

Locally.—Acid. Chromic, Acid. Tannic, Alum Insuffl., Argenti Nitras and Bismuth Insuffl., Bromphenobis, Calomel, Carbonis Det. Liq., Cullin. Ferri Perchlor., Formosyl, Glucose Solution as swab, Glycerin, Hyd. Perox., Ichthyol. Iodates, Iodi Tinct., Iodoform Wool, and Insuffl., Naphthol, Perfumed Formosyls (diluted), *Pot. Permang., Resorcin, Salicylic Acid, Thymol, Turpentine, Xeroform, Zinc Chloride.*

Chronic ear suppuration treated by B.I.P.P.—F. Stoker, L. ii./19,200.

Potassium Iodide 10 grains taken well diluted every 4 hours. Every 2 hours external meatus filled with Hydrogen Peroxide retained for 10 minutes. Nascent Iodine liberated within tissues of middle-ear cleft. Better results in acute and chronic cases than any other method.—S. P. Sturm, B.M.J. ii./26,1118.

Otitis Media.—Mercurome, Aeriviolet.

Ovarian Pain.—Ammonii Chlorid., Bromides, Castor. Tinct., Corp. Lut. Mammary Subs. (?), Morphine preps., Ovarian Subs., Phenazonum, Sumbul Tinct.

Overwork.—Two minims of Tinct. Digitalis, *t.d.* over a lengthy period.—D.M. in M.P.C., Oct., '26,1927.

Oxaluria.—Normally, Oxalic Acid is passed to the extent of 15 to 20 mgr in 24 hours. If this rise to 30 mgr. it becomes pathological. It is important in oxaluria to choose food rich in Magnesium and comparatively poor in Calcium—meat, flour, nuts, apples, peas, potatoes—as Magnesium Oxalate is soluble.—Sir W. Willcox, B.M.J. i./25,605.

Ozæna. *Locally.—Alum, Creosoti Vapor, Formosyl, Glucose Solution as swab, Hyd. Perox.* (*and Borated*), *Iodoformi Ung., Menthol spray and pigment, Nebula Formaldehydi, Perfumed Formosyls* (*diluted*), *Potass. Permang., Sodii Chlorinat. Liq., Sodii Chlorid., Thymaglycine, Thymol Lotio, Zinci Sulphocarb. Zinc. Chlor. et Sulphas, Ozæna Vaccine.*

Paraffin, high melting, injected into nasal septum.

Local application of Chaulmoogra Oil 30% in Vaseline and later an ointment composed of equal parts gave encouraging results in 10 typical cases.—B.M.J.E. ii./27,92.

Pancreatitis.—Pancreatin Stearettes.

Lœwi's Test for acute pancreatitis.—Instil 4 drops of fresh 1-1,000 Adrenalin Solution into one conjunctival sac; wait 5 minutes and instil another 4 drops, then wait half an hour. Dilatation of pupil, not infrequently eccentric and often conspicuously oval in form, indicates positive reaction. Negative result implies nothing.—H. Bailey, Pr., Aug., '26,122.

Panniculitis.—Caffein Cit., Magisal and Pyramidon combined.

Paralysis.—Iron Salts, Nuclein Injn., Parathyroid preps., Post-Pit. preps. Strychnine.

Paralysis Bulbar.—*Sodium, Lithium, Salicylic, or Iodine Ions.*

Paralytic Distention of Intestines.—Pituitary Ext. Liq. (posterior lobe).

Paralysis, Hemiplegia.—Arsenicals, Ergota, Iron Salts, Mercurialised Serum, Nux Vomica, Phosphorus, Physostigma.

Paralysis, Paraplegia.—Arsenic Comps. Organic, Ergot, Mercurialised Serum, Phosphorus, Physostigma, Strychnine.

Tryparsamide or an allied drug probably successful in the future. Some cases received eight 2 Gm. injections at weekly intervals, half to one hour after mid-day meal. Prolonged use worthy of trial.—M. Brown and A. R. Martin, L. ii./26,699.

General Paralysis Treated by Malaria.—The principle is that remissions in chronic disease may occur after an attack of acute specific fever. Many methods of producing artificial fever have been tried, *e.g.*, with (1) chemical substances, *e.g.*, Sodium Nucleinate, (2) toxalbumins, *e.g.*, Tuberculin, staphylococci, (3) acute disease. The latter is the most efficient. In this instance subcutaneous injections are given of 2 to 4 Cc. of blood from the vein of a patient suffering from benign tertian malaria. The malaria is cured by quinine, the inoculation strain of the parasite being very sensitive to it. Finally, Neo-Salvarsan given intravenously—symptoms of general paralysis disappear to a great extent.—W. L. Templeton, B.M.J. i./23,895; Prof. W. Yorke and J. W. S. Macfie have also reported on. Results so good as to permit discharge from hospital.—L. i./24,1017; i./26,427.

Record of 40 cases. It has been suggested that relapsing fever (a spirochætal infection, which produces a continuous fever for 3 or 4 days, instead of the intermittent fever for a longer period) might be better.—A. R. Grant, B.M.J. ii./23,698.

In some cases the induced malaria was severe. Dangers of spread of malaria and necessity for systematic blood examination for parasites, also necessity for use of mosquito nets.—Board of Control Circular, B.M.J. i./24,479.

After the induced malaria is cured by Quinine, the patient is treated with Neosalvarsan. At each injection an autogenous salvarsanised serum is injected into patients' subarachnoid space. Mercurial treatment *per os* is also given.—Sir J. Purves-Stewart, B.M.J. i./24,508.

Observations on the blood and cerebro-spinal fluids of 40 cases.—A. R. Grant and J. D. Silverston, L. i./24,540.

Need of caution. To be used only where the resisting powers are good, and paralysis is not of too long duration. Before inoculation, ascertain if patient can easily take Quinine.—L. i./24,562.

Withdraw the malaria-infected blood and immediately inject 1½-3 Cc. subcutaneously. When the donor and recipient cannot be brought together, venous blood, 10 to 15 Cc. is taken from a malaria patient and run into sterile 30 Cc. flask, containing 10 to 15 sterile glass beads. After shaking gently for ten minutes, the blood becomes defibrinated and partly hæmolised, and the serum is poured into a tube and kept in ice. By this method the serum can be sent where required, since it remains active up to 66 hours. For inoculation 2 to 6 Cc. is given subcutaneously or intramuscularly.—J. D. Silverston, L. i./25,737. Success of process endorsed by G. de M. Rudolf, L. i./25,793. *See also* B.M.J.E. i./26,66.

1,000 cases at Vienna. A pure tertian malaria must be used. Can be given from one paralytic to another by injecting 2 to 4 Cc. of blood taken from a vein in the arm and in various directions under the skin of the back. The donor's blood should be given before he receives any Quinine. Onset and course of the inoculated malaria differs from ordinary tertian malaria, and as a rule after 4 or 5 attacks of tertian it becomes quotidian, with often high temperature. As little as 7 grains of Quinine Bisulphate twice daily for 3 days and then once a day for 4 days will rid patient of malarial parasites. Then Neo-salvarsan is given.—J. Gerstmann, B.M.J. ii./25,481.

The treatment is hopeful. Relapses of malaria occur, but only in mosquito-infected areas.—T. Wishart Davidson, B.M.J. i./25,452. *See also* S. Grossman, L. ii./25,16.

First International Malaria Congress. Suggestion to use malaria inoculation in cerebro-spinal syphilis and in non-paralytic mental diseases, *e.g.*, dementia præcox, confusional insanity, and lethargic encephalitis. Epidemiology of malaria; antilarval measures.—B.M.J. ii./25,970.

The method amounts to periodical injection of destroyed red blood cells. —T. C. Clare, B.M.J. ii./25,640-644.

J. Gerstmann in Vienna obtained about 30% complete recoveries.—L. ii./25,389.

A surprisingly small number of persons who suffer from malaria are infective to anopheles. In induced malaria repeated feeds on an infected patient are needed to infect the mosquito. Much that is done in the way of antimalarial measures may be wasted effort. In treatment of general paralysis a rigor on alternate days is followed by greater benefit than a daily rigor. Allow the primary attack to go on 4 or 5 days then give 3 to 5 grains of quinine to temporarily check and wait for relapse. In this way the temperature is nearly always of the true tertian character with rigors on alternate days.—Leader, On Report of First Results of Laboratory Work on Malaria in England.—Col. S. P. James and P. G. Shute, B.M.J. ii./26,79.

Review of results of the treatment.—L. ii./26,1338. Improvement in well-being, cleanliness and conduct.—B.M.J. ii./26,603. No justification for withholding it from any case in the earlier stages.—J. L. Birley, L. i./27,589 No spectacular results to be expected either during or immediately after malarial period. Improvement slower from mental standpoint than from physical, and may be delayed, but great improvement in habits.—J. P. Steel and J. E. Nicole, L. i./27,485-6.

Salvarsan the best drug to terminate inoculated malaria, as it acts very quickly and is not followed by relapses.—Pres., Sept., '26,339.

Parasites, Animal, on Skin. *Locally.—Acetum Cevadiliæ, Anserine Mulls Medicated, Benzol, Chloroform, Cresol Soap (S. M. Copeman), Formosyl and Perfd., Hydrarg. Ammon. Ung., Hydrarg. Oleat., Lefroy's Petroleum Emulsion, Hydrarg. Perchlorid, Lotio and Ung., Lotio Hydrarg. Acetic, Lotio Parasit., N.C.I., Naphthalin Ung., Ol. Cajuput, Ol. Sassafras, Paraffin Liq. (friction with), Phenoloid Disinfectant—dil., Pyrethri Flor. Tinct., Stanni Oleas, Staphisag. Ol. or Ung., Sulphur Baths, Lotion, and Ung., Sulphurated Lime Lotion. Thymol, Westoran, Westropol.*

Clothes Louse.—Soak undervests in 1% Naphthalene and Sulphur in Benzol or Petrol. *See* Naphthalene. Immerse in *gasoline, petrol or paraffin,* or scald the clothes.—From a pamphlet by B. F. Cummings, issued by the British Museum (Natural History) Trustees. 30% *Borax* in powdered *black hellebore root* stated to prevent re-infection. Lice are *killed* by Cresol Powder 3% (Formalin is *inactive*), Sulphurous Acid, CS_2 and $CCl_4.SO_2$ from burning Sulphur in a stove best for rooms. *Westoran and Westropol* have been advocated. *N.C.I.* (*q.v.*) has been much used, also *Vermijelli.*

Para-dichlor.-Benzol is active, but causes burns on the skin. Clove oil also. The best *powder* is Naphthaline. Menthol is preferable in odor. It repels mosquitoes and fleas as well. For ***Bed Bugs*** Kerosene is best (Iodoform has no deleterious action on these). Pyrethrum is more powerful on bed bugs than on lice.—A. Castellani and T. W. Jackson, L. i./16,39.

Cytisine from Gorse.—Compared with Naphthaline, Cresylic Acid and others. It might be toxic to impregnate garments. Iodoform does not improve effect of Naphthaline. An emulsion of equal parts of common Cresol and Soap used in 5% solution in warm water is best, but might irritate the skin.—A. Bacot, B.M.J. ii./16,447. See also B.M.J. ii./19,603.

An ***exposure at 60° C. for 10 minutes*** is lethal to lice and their eggs. *Wax Thermometer* employed. Ampoules containing wax with this and somewhat higher melting point and glass beads would be useful in hot air sterilising chambers.—E. Emrys-Roberts, B.M.J. i./18,500.

See also **Pediculosis Capitis** *infra.*

Parasites, Intestinal—*See* **Worms.**

Parasites, Vegetable, on Skin. *Locally.—Acet. Cevadillæ, Acid Carbolic, Acid. Chrysophanic Ung. Acid. Sulphuros., Argent Oleas, Cupri Oleat. (for favus), Formol, Formosyl, Hydrarg. Oleat., Hyd. Perox., Lotio Parasiticidus, Perfumed Formosyls, Petroleum (for favus), Phosphor. Ol., Picrotoxin Pigment, Pyrogallol, Sassafras, Sodii Hyposulph., Thymol, Ung. Thorii Oleat.*

Paratyphoid. *see* TYPHOID.

Paresis.—Hydrarg. Perchlor. has been used.

Parkinsonism, Post Encephalitic.—Tinct. Bellad., Hyoscine Hydrobrom., Strammonium, Nicotine Injections. *See also* Encephalitis, Epidemic.

The Parkinsonian syndrome, the name derived from its resemblance to paralysis agitans, is the most frequent and characteristic of the sequelæ of epidemic encephalitis.—L. i./25,608.

Parkinsonism together with the 'Apache Type' in encephalitis lethargica. —A. Hancock, B.M.J. i./25,966.

Marked relief in chronic cases of Parkinsonism and disturbance of sleep, following continued administration of Hyoscine Hydrobromide 1/100 grain thrice daily by mouth, but not curative and symptoms returned on suspension of treatment.—A. G. Robb, B.M.J. ii./25,646.

Treatment of Parkinsonism syndrome, following encephalitis, by malaria. —R. N. Craig, L. ii./27,860.

Parotitis (Mumps).—Aperients, Saline, Iodides, Phenazone, Salicylates. *Locally.—Glycerin of Belladonna to neck, Iodine, Methysal Balm.*

Pellagra. *See Vol. II.*

Pediculosis Capitis (Lousiness).—*See also* Parasites, Animal, *antea.*

Head Lice.—Use 2% Phenol. Kills nits, also. If necessary cut the hair short and apply Kerosene, Petrol, Paraffin, Turpentine (*cf.* Sapo Olei Tereb.), Benzene or Xylol—not to be allowed to remain long on the scalp.—B. F. Cummings (British Museum).

Acetic Acid 10% dissolves the substance by which the nit is attached to the hair. Kerosene and Olive Oil equal parts left on for 24 hours and then wash off. 5% Mercuric Oleate in ether is effective.—P. S. Lelean.

For female children where the hair is long, thoroughly soak the hair in 1 in 40 Phenol Solution. It is not desirable for children under five. Patient lies on a bed with head over the edge,—the hair hangs over a basin. Sluicing with the Solution is continued for ten minutes, particularly over the ears. The hair is then wrapped in a flannel like a turban.—A. Whitfield.

Sodium Taurocholate (*q.v.*) Emulsion has been used.

Pediculi,—to kill in room, *i.e.*, after infection,—Nitrous fumes or Sulphuric. Acid as suggested under Malaria, Vol II.

Methods of killing lice and nits by heat.—W. W. O. Beveridge, L. ii./20,681. Light Wood Tar Oils for destruction of Lice on hair-clad areas.—A. Bacot, B.M.J. ii./21,853. Lice destruction on hair. Necessity for preparation to be non-inflammable and non-injurious to the skin and hair and easily removed afterwards.—E. S. Burt Hamilton, B.M.J. ii./21,968.

Pericarditis.—Aconite, Caffeine, Digitalis, Fæxin, Lotio Quassiæ, Mercury preps., Nuclein, Opiates and Musk (to relieve pain), Potass. and Sodii Iodid., Salicylates.

Belladonna Emp. and Liniment. Leeches, Ice, Blisters.

Peritonitis.—Acetanilide, Aconite, Anti-Gas Gangrene Serum, Colloidal Metals, Digitalis, Hydrarg. Subchlorid. cum Opio, Hyoscyamus, Opium and Belladonna, Phenazone, Tuberculin, Veratrum Viride. For collapse Curschman's Sterules, Caffeine Sod. Salicyl, etc. Vaccines.

Turpentine or Belladonna, Stupes or Poppy-head fomentations. For Pelvic,—Collargol Suppository.

In diffuse septic peritonitis there is fatal absorption through the thoracic duct. This explains why good results follow the administration of Opium. —W. A. Costain, L. i./23,1288.

Treatment of acute cases. Purgatives thought useful in preventing paresis or obstruction—3 grains Calomel given 24 hours after operation. Success depends on early and quick operation, suprapubic drainage, Fowler position, and administration of salines, either by rectum, or, if intolerant, subcutaneously into the chest.—F. Jeans, L. i./25,729.

Perspiration, Excessive.—Acid. Agaric., Acid. Phosph. Dil., Acid. Sulph. Aromat., Atropine and inj. hypod., Atropine Methyl Bromide, Belladonna, Ergot, Pilocarpine, Picrotoxin, Quinine preps.

Ac. Chromic (of feet), *Diachyli Ung.*, *Emol*, Formosyl, *Kaolin*, *Naphthol sol. in Alc. and Glyc.*, *Tannin.*, *Zinci Oleat, Pulv. and cum Thymol.*, *Zn. Oxid.*, *Zinc Carb.*, *Zinc Borate*, *Pasta Zinci et Amyl.*, '*X*' Rays (see Radiology).

Equal parts of Lead Plaster and Linseed Oil applied as a plaster under a bandage and left on 48 hours.—W. H. Robinson, B.M.J. i./21,216.

Perspiration, Fetid.—Mineral Acid and Vegetable Acids (Calcii Sulphas as in Contrexeville Water), Sulphur (of feet), and Tonics.

Acid. Carbol. Lotio and Ung., *Ac. Salicyl. Pulv. cum Talco*, *Alum. Acet. Lotio*, *Atropine Lin.*, *Borax*, *Diachyli Ung.*, Formosyl, *Glyc. Plumb. Subac. Ung.*, Iodates, Ung. Sulph. Zinc. et Kaolin (of feet), *Zinci Oleat. cum Thymol.*

Pertussis.—*See* **Whooping Cough.**

Pharyngitis.—*See* Throat, Inflammation.

Phlebitis.—Warm compresses and rest the limb with it raised. Potassium Citrate.

Phosphaturia.—Acid Sodium Phosphate and general tonic treatment.

Phthisis.—Acid. Camphoric., Acid. Cinnamic and Salts, Acid. Coumaricum, Acid Fluoric and Ammonium Fluoride inhalations, Acid. Hypophosph. and Hypophosphites, Acid. Lactic. and Lactates, Acid. Malic., Acid Sulphuros, Acriflavine hypod., Allium preparations, Arsenic (and organic compounds, *e.g.*, Arsamin), Aspriodine, Atropine (for night sweats), Benzoates, 'Brass Paste' (local), Cacodylates, Calcii Iodid. Elixir, 'Calcium' Colloidal, Cerium Salts, Cholesterin, Cinnaldehyde Capsules, Codeine (for cough), Creosoti Elixir and Comps., Crotalin, Durant's Injection, Elix. Hæmoglobin c. Lecithin, Emuls. Ol. Morrhuæ c. Lecithin, Emulsio Paraff. c. Pancreatin, Emulsio Petrolei, Eusol, Ferri Perchlor., Formalin Inhalant, Glycerophosphates, 'Gold treatment,' Guaiacol, Camph., Carb., Cinnam., or Phosph., Guaiacol-Salol, Hyd. Succinid., Ichthyol Capsules, Inj. Cacodyl. Co., Intramine (?), Iodof. and Creosote Oil, Iodof. and Benz. Chloride, Iodof. Glyc. Inj. (Abscess), Iodine, 'Nascent,' Iodoform in Ether Inj. intrav. (phthisis), Iodof. and Menthol Inj., Liq. Iodi Fort. (sinuses), Iodi Tinct. (tonic), Lecithin, Liq. Ferri Mang, Pept. c. Hæmoglobin, Iron Salts, Maltolivine, Marrubin, Mist. Creosoti Co., Mist. Guaiacol. c. Quin., Mist. Sodii Iodid. Co., Muthu's Inhalant, Naphthol-Camphor (inserted in joints), N. Horse Serum, Neb. Formalin, Ol. Morrhuæ c. Creosoto, Ol. Olivæ cum Acid. Oleic, Oxygen, Palladium Chloride, Pancreatin, Pavimol, Pepsin, Periodides of Codeine, Quinidine, etc., Phenol Sodii Sulpho-Ricinas, Pil. Niemeyer (fever), Piscidia, Pot. Bichrom., Quinine preps., Radium, Resorcin (Laryngeal), Salicin, Sanocrysin, Sirop Neurotonique, Sodii Cresotinas, Sodii Fluoridum, Sod. Hypophosp., Sod. Morrhuate Injected, Spleen Substance, Strych. Cacodylas, Sugar Feeding, Suprarenal Gland, Syr. Iodo-Tannic, Tartar Emetic, Tiodine, Tuberculin Ointment, Philip's by inunction Tuberculins, Trilactine (intestinal) Trypsin, Tylmarin and Comps., Oxygen inj. (peritonitis), Terebinth, Urea, Vanadates, Vap.-Creosot Co., Vap. Guaiacol Co., Verbasc. Thapsus, Yeast. *For Hæmorrhage* of, Amyl Nitrite Sterules.

Artificial Pneumo-thorax.

Aural tuberculosis in infants. Iodine Tincture weak, then strong, applied. On no account syringe the ear—Hydrogen Peroxide is bad.—W. Stuart-Low, Pr., July 22/57.

Inflation with oxygen—worthy of further trial.—R. Purves and E. J. Bilcliffe, B.M.J. i./24,906.

Washed red blood cells, disintegrated by heating to 56° C., are toxic to leucocytes, and it is inferred that the endocellular toxin is a factor in causing manifestations of bacterial infections. Method of treatment based on this deduction and aiming at immunising the body against this toxin. Tuberculous and non-tuberculous infections treated with varying success with weekly or twice-weekly hypodermic injections of 1 Cc. of destroyed red cells from patient's own blood.—T. C. Clare, B.M.J. ii./25,640-644.

Tuberculous Glands.—*Acriflavine, Radium, Guaiacol. See also* Phthisis.

Tuberculous Joints.—Zinc Chlor. Solution, Iodised Phenol.

Diagnosis.—*See* Tests, p. 946.

Phytosis of the feet. Induce desquamation. *Whitfield's Ointment.*—M. B. Hutchings, Jl. Trop. Med., Jun. 1/23,208.

Piles.—*See* **Hæmorrhoids.**

Pityriasis. *Locally.—Acid. Chrysophanic Ung., Boracis, Glyc. and Lotio Chaulmoogræ Ung., Glyc. Pb. Subac. Ung., Hyd. Oleas, Huile de Cade, Lotio Resorcini, Picis Ung., Perfumed Formosyls.*

The rash of streptococcal pityriasis frequently disappears on applying Zinc

Ointment either *per se* or containing Coal Tar 1 to 2%, or Anthrarobin 0·2%. —H. Haxthausen L. ii./27,373.

Plague.—Serum and Vaccine.

Bubonic plague treated with Neo-salvarsan and Pituitary injection.—R. Mansoor, B.M.J. ii./22,127,190.

Bubonic plague well treated with Iodine intravenously. 80% of cures in 100 cases: early cases best. 5 to 10 Cc. daily for 4 days of solution of 18 grains Iodine and 36 grains Potassium Iodide in 4 oz. Normal Saline solution. Mixture containing Potassium Iodide and stimulants every 4 hours. Buboes treated by injection subcutaneously of 1/16 grain Mercuric Chloride in 2 Cc. distilled water into lymphatic area drained by groups of glands in which bubo has formed.—I.M.G., Feb., '26,63.

For further details, *see Vol. II.*

Pleurisy.—Aconite, Ammon. Acet., Antimony, Apocynum. Bryonia, Colloidal Metals, Morphine preps., Pot. Iodid., Quinine preps., Sodii Salicylas, Sterilised Paraffin, Veratrum.

Locally.—Blisters, Cataplasm, Salicylic Co., Salicylic Ions, Ung. Hydrarg.

A post-graduate lecture by Sir W. Hale-White, Pr., July, 1921.

Pleuritic Effusion (Recurrent).—Intra-pleural Injection of Formalised Glycerin has been practised. *See* p. 127. Calc. Chlor. *per os.*

Pleurodynia.—*See* Myalgia

Pneumonia.—Aconite, Adrenalin, Ammon. Carb., Cit. and Chlor., Aspirin, Belladonna, Caffeine, Caff. Sod. Salicyl, Calc. Chlor., Camph. Sterules, Chlora and Digitalis (and with Nitroglycerin), Colloidal Metals, Creosot. Carb., Mist. Creosoti et Potass. Iodid., Digitalis, Ethyl Hydrocupreine ***base,*** Ferri Perchlor., Guaiacol, Hyd. Perchlor. *intrav.*, Hydrogen Peroxide intravenously, Hyoscyamus, Iodine *intrav.*, Liq. Fe. Acet., Nuclein inj., Ol. Allii Essent., Phenacetin, Phenazone, Pilocarpine, Pot. Nit. and Salt-free diet, Quinine preps., Salicin. Salines. Sod. Cit. (30 to 40 grains every 2 hours), Serum, Saline transfusion, Strophanth, Strychnine, Thyroid and Permanganate Inj. treatment.

Locally.—Vaccine, Cataplasm Salicyl. Co., Ice Bags (so placed as to include the inflamed area), *Leeches, Oxygen* (*and with Alcohol*). *Blood Transfusion.*

A case pulled through by shouting to patient to keep breathing and free use of Atropine, with Vaccine.

A good leucocytosis in early stage is favourable. When defective the old remedy—a large *blister*, may be valuable, *e.g.*, *Liquor Epispast.* freely painted on the back. Febrifuge drugs will only mask symptoms.—Sir J. Barr, B.M.J.i./14,69.

Pot. Iod. 4 grains, Pot. Cit. 10 grains, Liq. Ammon. Cit. ½ oz., Water to one ounce—every four hours. Dr. Crowly's treatment for pneumonia.—Facile princeps.—J. A. W. Pareira.

Broncho-pneumonia treated by Iodine intravenously. 20 to 30 minims of Iodine Tincture diluted with 9 Cc. of N. Saline. Success.—D. M. Baillie, L. i./19,423.

Patients will stand large doses of Quinine.—S. S. Cohen, Pres., Apl./20,167

A medical man on his own attack. He prescribed his own treatment. Lay on his back with head raised enough for the mouth to be above the bed clothes. Breathing: slow and shallow, and no moving. Diet: extremely spare—drank a lot of water; plenty of fresh air; Herpes appeared on the lower lip (is there connexion between herpes and pneumonia?) Gaultheria Liniment good for pains. Morning rises of temperature experienced. Happy termination.—L. i./22,721.

Alcohol (whisky and soda) used freely. Digitalis *q.s.*, to reduce pulse rate. If temp. was 104° F., 1 or 2 grains of Antifebrin added. A high temp. has an exhausting effect on the heart. Opium given to soothe cough. The prescription was therefore: Quinine 1 grain, Digitalis Powder ½ or ¼ grain, Antifebrin 1 or 2 grains, Opium Powder ¼ grain: in powder or pill—one every 2, 3 or 4 hours.—J. T. Maclachlan, B.M.J. i./23,897. *See also* INFLUENZA.

Treatment of acute lobar pneumonia.—John Hay, B.M.J. ii./27,477.

Abdominal distension as a complication of pneumonia may be treated with Pituitary injection intravenously, 0·2 units being a safe dose for a child of 3. —L. B. Cole, L. ii./27,881.

Acute pneumonia in early childhood.—B.M.J. ii./27,582.

Poisons.—See **Antidotes** under each heading in the text, and **Emetics** also special Chapter at end.

Poliomyelitis, Acute.—Incubation period stated is to be 2-10 days, average 3-4 days. Home contacts should be excluded from school for at least 3 weeks and if paralytic signs are absent and general health good the child may be readmitted to school after 6 weeks.

Immune serum 10 Cc. intraspinally daily for several days from one who has passed through an attack and who is free from syphilis taint. *Hexamine* is usually given (10 grains every 4 hours) in acute stage, but doubtful if of much value.—E. Farquhar Buzzard, B.M.J. ii./21,225.

Rest is the essential treatment. All patients should be isolated in the acute stage. Criticism of Uppingham School for closing for 14 days, which probably meant spreading infection. Incubation period said to be 4 or 5 days.—B.M.J. ii./26,947; L. ii./26,1070,1085,1088.

Ultra-violet light and diathermy useful.—C. B. Heald, L. i./25,1162.

Polypi. *Locally.—Hydrogen Peroxide* (and Borated)—styptics.

Aural Polypi—discussion on removal of.—J. S. Fraser and S. Young, B.M.J. ii./22,467. As a matter of routine Zinc Chloride and Alcohol drops instilled for a week before removal of a polypus, when bathed in pus.—Sir J. Dundas Grant, *ibid.*, p. 468.

Polyuria.—To reduce output—pituitary. *See also* INCONTINENCE.

Portwine Stains.—*Radium.*

Post-Partum Hæmorrhage.—*See* **Hæmorrhage.**

Pregnancy.—*See* **Uterus, to contract.**

Pregnancy, Vomiting of.—Aconite, Adrenalin, Argent Nit., Arsenic, Belladonna, Bismuth and Pancreatin, Cerii Oxalas, Chloral, Chloroform, Cocaine, Corp. Lutea, Creosote, Hydrocyanic Acid, Iodides, Iodi Tinct. m.i. in ounce Aq. every two hours. Ipecac., Menthol, Morphine preps., Nux Vomica, Pepsin, Phenazone, Pot. Permang., Quinine preps., Sedeff, Spt. Nucis Juglandis.

To increase elimination of toxic degradation products.—Calomel with Sodium Bicarbonate.

Glucose injections useful.—V. J. Harding and B. P. Watson, L. ii./22,649.

Prickly Heat.—Hyd. Perchlor. Lotion (*q.v.*) made with Dilute Hydrochloric Acid.

Prolapsus Uteri.—Quinine injected.

Prostration.—Amyl Nitrite Sterules, Catha and Coca preps., Oxygen Inhalation, Stimulants. For rectal Injections see p. 402 *et seq.*

Prurigo.—Arsenic, Bromides, Cantharides, Iron Salts, Pilocarpine, Quinine, Sodii Carb., Trilactine.

Locally.—Ac. Carbol. Lotio and Ung., Alc. Isopropyl, Borax, Cocaina, Ichthyol, Iodine Colloidal, Iodof. Ung., Liq. Ammon. Dilut., Liq. Hyd. Perchlor., Liq. Pb. Subac. Dil., Pilocarpine, Staphisagria, Sulphur Ung., Tar, Ung. Rusci. Co., Ung. Sulph. cum Hydrarg., Anderson's Ointment.

Pruritus Ani, Vulvæ, &c. *Locally.—Acid Carbolic. Lotio and Ung., Acid. Picric Lotio, Acid. Salicylic. Ung., Acid Sulphuros. Lotio, Alkalis, Aloes, Alum Lotion, Anderson's Ointment, Argent. Nit. in Sp. Æther Nit., Bismuth, Ca. Lact., Calomel dusted on, Carbolic and Cocaine Lotion, Carb. Deterg. Liq. Lotio 2%, Chloretone, Chloroformi Ung., Cocain, Ung., Conii Ung., Formosyl, Gallæ cum Opio Ung., Glyc. Plumbi Subac. Ung., Hyd. Oleat et cum Morphinæ, Hyd. Subchlor. Ung., Hydrastis Liquid Extract and Hamamelis injected, Ichthyol Suppos., Lotio Nigra, Mentholeate, Menthol et Boracis Lotio., Naphthalin Ung. and Suppos., Orthoform, Pot. Cyanid. Lotio., Sod. Silicas intrav., Sod. Salicyl, Sod. Thiosulph., Tampons rar., Tannin, Tinct. Cannabis, Ung. Acid. Boric., Ung. Rusci Co., Utanii Oleas, Radium.*

Dhobie's Itch Ointment (see Dhobie's itch) relieves.—R. C. Connor, Int. Conf. Trop. Am., '24,498.

Pruritus ani and pruritus vulvæ of mycotic origin—treatment.—A. Castellani, U.F.C., '25,249.

Psoriasis.—Arsenic, Harrogate Water, Hydrarg. Iodid. Viride, Iron Salts, Morrhuæ Ol., Quinine, Sod. Pot. Bism. Tart., Sod. Salicyl intrav., Sod. Silicas intrav., Sulphur, Thymus Gland Ext., intram. (see also L. ii./27,900), Thyroid (Standardised), Trilactine, Tylcalsin (and intrav.).

Locally.—Acid. Carbolic, Acid. Crysophanic, Acid. Pyrogall., Acid. Salicyl., Anserine Mulls, Betulæ Pyrolig. Ol., Carbonic Snow, Cocaine Ung., Carbonis Deterg. Liq. Lotio, Formosyl, Huile de Cade, Naphthol, Picis Ung., Pot. Sulph., *Rusci Pyrolig. Ol., Salicin, Sodii Carb., Sulphides (in baths), Sulph. Hypochlor. Ung., Thorii Oleat. Ung., Thymol Iodide, Ung. Creosote, Ung. Iodi Intinctum., Ung. Rusci Co., Alkaline Baths.*

Ammoniated Mercury 1 dr., Liquor Picis Carb. ½ ounce, Paraffin Ointment B.P. 6 ounces well rubbed in with a piece of flannel. If it fails, try Chrysarobin Ointment avoiding face, hands and scalp and stop treatment if Chrysarobin erythema appears on any part.—H. G. Adamson, L. i./17,223.

Acute rapidly spreading psoriasis treated with Fowler's Solution *per os*, sulphur bath and sulphur 2% in Salicylic Vaseline to the scalp and 1% to the body.—E. Fleming Griffin, B.M.J. ii./21,41.

Psoriasis of very long standing greatly benefited by autogenous vaccine (Staph. alb.) and thyroid.—S. E. Denyer, B.M.J. ii./22,32.

Baths containing an emulsion of Oil of Cade and Chrysarobin used in extensive cases of psoriasis as an alternative to their application as ointments.—R. Sabouraud, per L. i./23,1318.

Chrysarobin in acute cases may be disastrous. Soothing remedies needed. Oily Calamine with small proportion of Ichthyol. Emetine ⅛ grain hypodermically increased. Results were disappointing. Arsenic over-rated. Auto-hæmotherapy no value. An entero-vaccine, containing B. Coli and Enterococci, of use as an aid to other treatment. Terpichin, a preparation containing Turpentine, Quinine and a local anæsthetic, intramuscularly, useful: also Intramine. Tar also—Tar Ointment, Salicylic Acid Ointment, Mercur. Nitrate Ointment dilute, Lead Subacetate Ointment, in equal parts. It is tenacious and requires rubbing—this, of itself, is good.—R. W. MacKenna, B.M.J. ii./26,338. *See also* J. H. Heaney, B.M.J. ii./27,1136.

Chrysarobin and X-Rays advised.—E. F. Skinner, B.M.J. ii./26,341.

Monilia as a possible factor. Monilia-like organisms found in 85% of stools of persons with psoriasis; similar, or identical, organisms cultivated, or demonstrated in the skin scrapings in 25%, and present in the blood in 14%. The injection of an emulsion of the killed organism was curative.—M. S. Fleischer and M. Wachowiak, Arch. Dermat. & Syph., per Jl. A.M.A., ii./25,746.

A case in which a Monilia was isolated from skin, mouth and sputum.—G. S. Sanders, L. ii./25,1226.

Ptyalism.—*See* **Salivation.**

Puerperal Fever.—Acid. Boric, Acriflavine Injection, Antidiph. Serum *per os.*, Antifebrin, Antipyrine, Anti-Strepto. Serum, Ferri Perchlorid., Jaborandi, Nitroglycerin, Nucleinic Acid, Opium, Peptone intrav., Pilocarpine, Pot. Brom. combined with Belladonna, Quinine (2 grains every four hours).—V. J. Glover, L. i./17,352. Streptoco. Vaccine, Sulpharsphenamin, Terebinth. Ol., Saline transfusion, Stimulants.

Vaginal Injections, Mercuric Iodide Solution, or of Cyllin, Irrigation with Injectio Iodi., C.H.W.

Give a quickly acting aperient, Croton Oil (or 'Oleum Elliott'), Saline injection, Morphine, Thyroid (30 to 40 grains), Nitroglycerin subcutaneously, Veratrum Viride, Pilocarpine, Oxygen.

Acid Sulphuric dil. 25 to 35 minim doses has been advised in puerperal infection (also for boils, carbuncles, etc.), in all labours whether with manipuations or surgical interference or not.

Swabbing out uterus with Iodine, then douche, Strepto. Serum and subseq. Quinine intrav.—B.M.J.E. i./24,68.

Streptococcic Serum, Collosol Iodine intravenously, Sodium Bicarbonate 0·9% intravenously.—G. Fitzgibbon and J. W. Bigger, B.M.J. i./25,773.

Good results from immuno-transfusion, *i.e.*, transfusion with blood from donor immunised three hours previously with stock vaccine.—B. P. Watson, B.M.J. ii./25,1126.

Glycerin of value—assists uterus to drain by promoting flow of lymph.—H. J. Phillips, B.M.J. ii./25,1125.

Iodine intravenously 'a most efficacious remedy,' ½ grain in 2 Cc. sterile water on 4 consecutive days.—S. R. Ingle, I.M.G., July, '26,346. (1 grain of Potassium Iodide needed to dissolve it.—W. H. M.)

Purgatives.—*See* **Constipation.** **Purgatives, Hypodermic.**—Aloin, Apocodeine, Colocynthin (may be emetic), Physostigmine.

Purpura.—Calcii Chlorid., Ergot, Iron Salts, Phosphorus, Quinine preps., Oleum. Tereb.

Purpura Hæmorrhagica.—Blood Transfusion.

Pyæmia.—Autogenous Vaccine.

Pyelitis.—Benzoates, Collinsonia, Erigeron Oil, Hexamine Camphorate, Vaccine.

Locally.—Mercurome, Colloidal Silver.

Fluid intake restricted, not more than 300 Cc. daily from the 2nd to the 4th day. 1 Gm. Urotropine and 1 Gm. Sodium Salicylate with a little Phosphoric Acid 3 times a day. Hot air baths twice a day to promote sweating. From the 5th to the 7th day drugs discontinued and the system flushed with large quantities of water.—Daniel, per Clin. Jl., June 27/23,310.

Pyloric Stenosis—Atropine.

Pyorrhœa Alveolaris.—Colloidal Silver hypod., Vaccines.

Locally.—Antiseptic mouth washes, e.g. Lotio Acidi Citrici et Phenolis, Argyrol, Eusol, Emetine HCl. Solution ½% applied locally and injected. *Cremor Magnesiæ, Formosyl T. Paste. Vide* Emetine and Pigmentum Ipecac. et Arsen. *Zinc Ionisation.*

L. Williams decries the fashion of wholesale teeth extraction or 'pyorrhœa' and quasi-pyorrhœa—Vitamins are necessary.—B.M.J. i./23,1012.

Destruction of spirochætes in pyorrhœa aimed at by injecting a few drops of 0·1% Sulpharsenol into the gums, with subsequent massage. When more normal in appearance, Gomenol injected.—M.P., Nov. 24/26,428.

Pyorrhœa due to septic tooth-brushes. The brush should be kept in Carbolic Acid solution 1 in 20 when not in use.—F. D. Donovan, L. ii./27,171.

Pyrosis.—Acid. Hydrocyanic., Acid. HCl. Dil., Acid. Nit. Dil., Acid. Sulphuros., Atropine methyl-bromide, Bismuth preps., Carbo Ligni, Cerii Oxalas, Cremor Magnesiæ, Magnesia, Sod. Bic., Sodii Sulphocarb.

Quinsy.—*See* **Throat Inflammation.**

Rabies.—*See* **Hydrophobia.**

Rat-bite Fever.—Arsenobenzol.

Rectum and Colon Ulceration. *See* **Colitis.**

Rectum, Prolapse of.—Alcohol Injection *vide* Alcohol Refs.

Remittent Fever.—*See* **Malaria.**

Restoratives.—*See* **Debility.**

Rheumatic Endocarditis, *see* **Endocarditis.**

Rheumatism, Acute.—Acid. Phosphoric, Acetanilide, Aconite, Actæa, Aspirin, Aspriodine, Benzoates, Caffeine-Chloral, Cocaine Ionisation, Colchicum, Fæxin, Ferri Perchlor., Guaiacum, Lemon or Lime Juice, Lithion, Magisal, Opium, Ozonic Ether, Phenacetin, Phenazonum, Phenyl-Aspriodine, Phenocoll, Pot. Acet., Bicarb. Cit. or Nit., Quinine preps., Salicin (bold dose), Salicylates, Salol, Sedasprin, Sod. Bicarb., Sod. Sesquiphosph., Thyroid and Manganese, Tylcalsin *per os* and intrav., Tyllithin, Tylmarin, Tylnatrin *per os.* and intrav. Strepto Vaccine, Veratrum.

Locally.—Methyl-Aspriodine Balm and Linim., Methysal Balm, Ung. Agotan. *See also* Absts. under Sodium Salicylate, Aceto-Salicylic Acid, Salol, etc.

B. Coli Vaccine intravenously in recent arthritis.

Rheumatism, Chronic.—*Discover cause.* Actæa, Antim. Sulphurat., Arsenic, Aspirin, Aspriodine, Bisciniod, Caffein Salicyl., Cinchonidinæ Salicylas, Colchicum, Conf. Guaiaci Comp., Ethyl Iodid., and Salicyl., Colloidal Metals, Ferri Iodid. Syr., Ferri Salicylas, Formates, Gaultheriæ Oleum, Gelsemium, Guaiacol Carbonate, Piperazine, Quinine Periodide, Iodoprotein, Lithii Hippuras, Lithion, Magisal, Manaca, Methylene Blue, Ol. Succini, Pelletierina, Phenoquin, Phytolacca, Pilocarpina, Piperazin, Benz. and Glycerop., Podophyllin, Pot. Iodid. et cum Quinina, Quinin. Hydriodid., Radio-active Waters, Radium, Emanation Inhalation, Rhus, Salol, Sodii Boro-Salicylas, Sodii Formas, Sulphur, Trilactine, Tylcalsin, Tyllithin, Xanthoxylum.

Locally.—Alcoolat de Fioraventi, Atropinæ Linim., Bellad. Linim. and Linim. Co., Belladonnæ Chloroformum and Tinct. Ætherea, Betol, Camph. Co. Linim., Capsici Emp. and Linim., Chloral cum Camphor., Caffein and Sodium Salicylate injected, Croton Oil Lin., Ethyl Chloride Spray, Eucalyptus Oil, Glycopasta Aconiti et Bellad., Iodine, Cocaine Solution and Chloroform Ionised, Lin. Menthol Comp., Lithium Iodide Ionised, Mag. Sulph. Inject., Methyl-Aspriodine Balm and Lin., Methysal Balm, Methyl Salicyl. and Plaster and Ung., Ol. Succini, Potassii Lactas, Sal. Marin. Artif., Sassaf., Oil Sod. Salicyl. c. Sod. Iodid. intrav., Ung. Agotan, Ung. Iodi Intinct., Ung., Acidi Salicyl.

Removal of offending teeth. Colon Lavage.

Guttæ Iodi (Farrer). Iodine 4 grains, Alcohol 90% 1 drachm, Glycerin to 1 ounce. *See also* TINCT. IODI FR. CX. 1908, for 'intensive' treatment.

Rheumatoid Arthritis. *Seek infective focus.*—Actæa, Adrenalin, Arsenic, Aspirin, Aspriodine, Colchicum, Emulsio Paraff. et Bismuth., Ferri Iod. Sacch., Formates, Guaiacol Carb. Inj. Guaiacol-Iod. Camph., Iodoprotein, Iodolysin, Formates, Guaiacol Carb., Inj. Guaiacol-Iod. Camph., Hyd. Salicyl., Iodoprotein, Iodolysin, Lithium, Magisal, Morrhuæ Ol. Pot. Brom. and Iodid., Sedasprin, Sulphur Injections (A. T. Todd, B.M.J. i./27,1048), Strontii Salicyl *intrav.*, Tylcalsin, Tyllithin, Thymus and Thyroid Vaccine.

Artificial abscess formation by Turpentine Injection (non-specific immunisation).

Locally.—Ac. Formic Injections, Hyd. Oleas c. Morph., Radiant Heat, Radium Sulphides (baths of), 'X' Rays, Ung. Sabinæ in conjunction with Cantharides. Salol Collodion, Iodine, and Salicylic Ions, Blister applied to the spine. B. Coli Vaccine intravenously.

Milk injections 4 Cc. increased.

The commonest cause of infection is found in connection with the teeth sockets.—X-Ray examinations. Sir W. Willcox believes in the infection theory as opposed to Uric Acid. Etiological factors. Streptococcal or B. Coli infections—B.M.J., June i./21,804, *see also* W. J. Midelton, B.M.J. ii./21, 462.

Pathway of infection in the rheumatic group of diseases—mouth, teeth, gums and tonsils.—G. L. Kerr Pringle, Pr., Oct. 1921, p. 229.

Depressing surroundings, damp and cold, clay soil, business or domestic worries are factors. Massage often useless. Ionic medication good.—Naunton Davies, Pr., Dec. 1921, p. 432.

'*T.A.B.*' *Vaccine* to produce a non-specific reaction. Large doses, *e.g.*, 250 or 500 mills. at first and subseq. 1,000 and even 2,000 mills. It is worth trying effect of a vaccine made from the teeth or bowel organisims. *See* Special Absts. p. 675.

B. Coli vaccine intrav. will supersede autogenous subcutaneously.—H. Laurie, per Jl. Trop Med., Oct. 15/23,320.

Treatment of chronic arthritis. Antigen therapy supplementary to drainage of infected area, not a substitute for it. Chronic arthritis in most cases part of a general disease.—Sir Thos. Horder, B.M.J. ii./25,633.

Whereas a generation ago it was a moot point whether rheumatoid arthritis is sometimes of infective origin, the question now is: 'Is it always infective?' —J. M. H. Munro, B.M.J. ii./25,598.

In rheumatoid arthritis of infective type, protein shock therapy worth trying.—David Campbell, B.M.J. ii./25,638.

The terms 'rheumatoid arthritis' and 'osteo-arthritis' are unsatisfactory and confusing: 'Chronic arthritis' preferable.—A. G. Timbrell Fisher, B.M.J. ii./25,599.

'Infection' must be regarded as the primary cause in the majority of cases. Review of the various foci of infection.—Sir W. Willcox, B.M.J. ii./25,600.

Sulphur demineralisation a special metabolic trouble in rheumatoid arthritis—4 to 5 Gm. urinary Sulphur being eliminated instead of the normal 2½ to 3 Gm., and the total percentage of neutral Sulphur being increased from 14 to 20% to 25 to 30%. This is explained by deficiency in oxidation processes of the organism. Predisposition towards hypo-oxidation and Sulphur demineralisation may exist and help development of disease. Often checked by Colloidal Sulphur injections.—A. Cawadias, B.M.J. ii./25,602.

Causation and treatment. Oral sepsis, responsibility of; intestinal auto-intoxication; genito-urinary tract infections; respiratory; skin infections. Vaccines, Sulphur compounds, Protein shock therapy (Auld), T.A.B. Vaccine —a good review.—Sir H. Rolleston, B.M.J. ii./25,589.

Association with thyroid function. Thyroid useful; some remarkable successes.—L. i./25,986. Confirmation by L. J. Llewellyn, L. i./25,1203.

Arthritis in childhood.—F. J. Poynton, L. i./25,807.

Pistany Mud Baths efficacious.—Pres., June, 1928, 201—203.

Rhinitis Atrophic.—*Borax.*, Zinc Sulphanilas packing. *See also* Catarrh, Nasal. **Rhinitis.**—*See* **Catarrh, Nasal.**

Rickets.—Acid. Phosph. Dil., Calcii Hypoph. Syrup., Calcis Liq. Calcii Chlorid. Elix., Calc. Lactas, Phosph., Lacto-phosph., Syr. and cum Ferro. Cinchona preps., Emulsio Ol. Morrh. c. Glyceroph., Ferri Phosph., Syr., Ferri Iodid., Foods A, B and C, Glyceroph., Glyc. Glyceroph. c. Med. Rub., Lecithin Emulsion, Liq. Ferri Hypoph. Cc., Liq. Iodo-Ferro-Mang. Pept., Malt Ext. c.

Hæmoglobin, c. Pancreatin, etc., Marrubin (and Comps.), Milk and Glyceroph., Morrhuæ Ol., Ol. Morrh. Phosp., Phosphorated Oil, Radiostol preps., Sodii Phosph., Sulphur, Thymus, Thyroid, 'Three Gland' and 'Four Gland' Elixir and Tablets, Trilactine.

cf., Accessory Food Factor Chapter.

Sunlight, Artificial 'sun.'

The marine and light treatment of rickets.—L. i./25,1027.

Rigg's Disease. *See* Pyorrhœa Alveolaris.

Ringworm.—*See* **Tinea.**

Rodent Ulcer. *Locally.—Chromic Acid, Scarlet 'R,' Carbonic Snow, Radium, 'X' Rays, Zinc Ions.*

Saint Vitus's Dance.—*See* **Chorea.**

Saliva, to promote.—Ether, Ginger, Horseradish, Iodides, Jaborandi, Mercurials, most Emetics, Mustard, Pelletierine, Pepper, Physostigma, Pyrethrum Glyco-gelatin (Pastils of), Sorbus Aucup. Berries, Tab. Formalin, Tobacco.

Saliva, to check excessive.—Acid. Hydroch. Dil., Atropine and Belladonna, Chlorates, Coto, Picrotoxin. Of syphilis after excessive Mercury: Sodium Chlorate.

Locally.—Acid. Boric., Alumen, Borax, Chlorates, Creosoti Vapor, Formosyl.

Sarcinæ.—Ac. Sulphuros., Betanaphthol, Bisciniod, Calcii Chlorid. Salol, Sodii Hyposulphis, Sodii Metabisulphis, Sodii Salicylas, Sodii Sulphis.

Lavage.

Scabies. *Locally.—Ac. Sulphuros, Calcis Sulphurat. Lotio, Cyllin, 'Danish' Ointment, Hexamine intrav., Hydrarg. Perchlorid. Ung., Formosyl and Perfumed, Nascent Sulphur, Liq. Carbonis Detergens, Lotio Boeck, Manganese Butyrate, Naphthalin Ung., Naphthol Ung., Peru Balsam, Pig. Thymol, Potass. Sulphurat., Balnea, Styracis Ung., Sulphur Ung., Ung. Ac. Salicyl* 50%, *Ung. Resorcin Co., Ung. Rusci Co., Ung. Thorii Oleat.*

Scabies cured in 24 hours by an Ointment freshly made of Sulphide of Potassium and Zinc, in Vaseline, Lanoline and Paraffin, smeared thoroughly over the skin, but not rubbed in.—L. i./24,1112. *cf.* Lotio Alba Mackenna.

Scalds.—*See* **Burns.**

Scarlatina.—Aconite, Ammon. Carb., Antistreptococcic Serum, Belladonna, Calcium Sulphid., Ozonic Ether, Pot. Cit., Potassii or Sodii Chloras.

Locally.—Antiseptic Gargles and Mouth Washes, Compress of Salicylic Acid 2% *in Alcoholic Solution.*

Eucalyptus and Carbolic Oil treatment of scarlet fever a failure—all cases of scarlet fever should be isolated for at least 8 weeks.—G. Gushue-Taylor, L. ii./23,505.

Scar Tissue.—To relax and remove. From gullet, stomach, also uterine adhesions.—Cicatricine and Inj. Thiosinamin Sod. Salicyl.

Sciatica.—*Discover if possible infective focus and remove.*—Acetanilide, Actæa, Alum Aceto-Tatras, Aspirin, Aspriodine, Amidopyrin Aspirinate, Bisciniod, Cap. Colch. Salicyl., Codein., Colchicum, Conf. Guaiac. Comp. Ether Inj., Lithii Citras, Methylene Blue, Morphinæ hypod., Oleanodyne, Phenozone (and Injected c. Cocaine), Opium Ext. with Valerian or Suppos. with Cocain, Piperazine, Pot. Iodid., Quin. Salicyl., Salol, Sedasprin, Sodii Salicylas, Strychnine, Terebinthinæ Ol., 'Theo-Sod.-Acet.', 'Theo-Sodo-Form,' 'Theo-Sodo-Sal.', Thyroid and Manganese, Trilactine, Tylcalsin, Tyllithin, Tylcalsin intravenously, Quin-Urea inj., Vaccines.

Locally.—Aconitinæ Ung., Bellad. Lin., Chlorof. Lin., Ether inj.. Menthol c. Camph., Menthol Lin., Methyl-Aspriodine, Methysal Balm, Veratrinæ Ung.

Injection into sciatic nerve, where it crosses neck of femur, of 1% solution of Quinine and Urea Hydrochloride, specific for sciatica.—B.M.J.E. ii./26,96.

Scrofula.—Arsamin and other Org. Arsenic, Calc. Lact., Calcii Chlorid., Calcii Phosph., Calcii Sulphid., Elix. Hæm. c. Lecith., Ext. Malticum Iodinol, Ferri Iodid. Syr., Ferri Phosph., Hyd. Iod. Virid., Iodoprotein Tabs., Iodum, Marrubin and Comps., Morrhuæ Ol., Quinine preps., Sodii Phosphas, Sirop Neurotonique, Syr. Iodo-Tannic, Syr. and Vinum Tann-Iodo-phosph., Chaulmoogra Oil.

Locally.—Pot. Sulphurat. Lotio Alba, Mackenna.

Scurvy.—Arsenic and Iron, Calc. Lact., Lime or Lemon Juice, Phosphorus, Potass. Chloras and Citras, Red Bone Marrow, Sodii Citras, Sodii Lact.

Scurvy, Infantile.—The anti-scorbutic factor of Lemon Juice after removal of acids, etc., likely to be irritant has been used clinically—the equivalent of 6 to 12 lemons daily.—A. Harden, S. S. Zilva, and G. F. Still, L. i./19,17.

Orange Juice concentrated at 37° C. under a partial vacuum found much more efficacious, as well as being cheaper, than Lime Juice in the prevention of scurvy.—J. L. Priston, Jl. R.N.M.S., Jan., '26,1.

Cf., ' Water-Soluble C ' Accessory Food Factors.

Sea-Sickness.—Acid. Hydrobromic., Antipyrine, Amyl Nitris (inhaled), Bon Voyage, Chloralamide, Chloral Hyd., Chloroform and Tinct. Co. Chlorof. Caps., Cocainæ Hydrochlor., Hyoscyamina ($\frac{1}{200}$ gr. *per os* good), Iodi Tinct., Morphinæ inj. hypod., Nitroglycerin Tablets ($\frac{1}{200}$ gr.), Phenazone, Pot. Bromid., Sedasprin, Sedeff, Sod. Brom., Sodii Citras *per rectum*, Sodii Nitris, Malourea and Sodium Malourea.

Counter-irritants to stomach, Ice-bags to the spine.

Ipecacuanha Wine to 2 to 3 minim doses is specific.—A. T. Thompson.

Sedative treatment: Liquor Iodi Fortis, Dilute Hydrocyanic Acid, *a.a.* 12 minims, Water to 6 ounces. One ounce every 10 minutes. Four doses taken effectual. Then *Aperient*: Black Draught. *Subsequently* tonic, Potassium Bromide, Strychnine, Gentian, etc. Successful.—A. H. Hare.

As preventive, 1/60 grain Atropine Sulphate *per os*, followed by two 1/120 grain doses at half-hour intervals. Also give for treatment.—B.M.J.E. ii./26,75.

A good dose of sea-water is the sailor's remedy for seasickness. Half a tumbler of sea-water from a Winchester labelled ' Mistura Oceani Pacifici ' cured all but 4 of 66 men paraded sea-sick on a voyage from New Zealand to S. Africa.—J. S. Purdy, B.M.J. ii./25,628.

Glucose in 3 drachm doses produced an effect superior to that obtained with Atropine, Strychnine, Chloral, Bromides, Alkalies, and the various patent medicines.—G. H. Oriel, L. ii./27,813. *See also ibid.* 1146.

Sclerosis, Disseminated—Typhoid Vaccines Intravenously (Sir J. Purves-Stewart), see p. 951.

Sclerosis, Multiple.—Silver Salvarsan.

Seborrhœa. *Locally.—Formosyl Ointment, Isopropyl Alc. (diltd.), Resorcin Lotion and Ointment, Sulphur and Salicylic Acid Ointments, Thorii Oleat. Ung.*

Dandruff to Remove.—Wash the head with soap and spirit and then dry. Rub in well an ointment of Precip. Sulph. gr. xv., Salicylic Acid gr. xv., Soft Paraffin 1 ounce, or if greasy applications disliked a lotion of Salicylic Acid 2 drachms, Castor Oil 3 drachms, Eau-de-Cologne 1 ounce, S.V.R. to 6 ounces. In chronic cases Sulphur Præcip. ½ ounce, Glycerin 2 ounces, water to 4 ounces. C. D., Sept. 22, 17.

Senescence (Physical Deterioration) and Senility. A paper describing work at Chelsea Hospital.—L. i./22,874. *See also* Cavendish Lecture by Leonard Williams, L.ii/27,1179.

Septicæmia and Pyæmia.—Acriflavine, Antistrepto. Serum and Vaccine, Antistaph. Vaccine, Ferri Perchlor., Gentian Violet inj., Hyd. Perchlor. intrav., Hyd. Benz., Nuclein, Peptone Injections, Quinine Resorcin, Salicin, Sulphites, Saline Injection, Sod. Cacodyl, ' S.U.P. 468 ' and allied compds., Thyroid and Manganese.

Dakin's Solution must *not* be given intravenously.

Shingles—See **Herpes Zoster.**

Shock, Surgical.—Adrenalin, Brandy hypod., Caffeine Sod. Sal., Calc., Chlorid. Injn., Camph. in Ether, Coramine, Ergot, Ether, Gum Acacia in Saline (or plain), Morphine, Oxygen with Alcohol, Pituitary, Suprarenal, Strychnine.

Intracardiac injection of Adrenalin Solution 1 Cc., *v.* p. 980.

Sickness.—*See* **Vomiting,** also **Sea-Sickness.**

Sinuses, Tuberculous.—Iodoform preps., Creosoted Oil.

Skin.—*See* **Eczema, Psoriasis, &c.**

The urine in skin affections is always more acid (pH 4·8 to 5·8) than normal (6·4 to 6·8). Alkalies of value, *e.g.*, Sodium Bicarbonate 30 grains, Potassium Bicarbonate 25 grains, Potassium Citrate 20 grains, Compound Cardamom Tincture 30 m., Peppermint Water to 1 ounce, thrice daily increasing or decreasing to render urine normal.—F. C. Doble, L. i./25,272; *see also ibid.* 407,464,465,516.

Skin Disinfection.—*See* Skin Sterilisation.

Skin Irritation. *Locally.—Acid. Hydrocyan. Dil., Corrosive Sublimate lotion, Cremor Sicc. preps., Formosyl Cream, Lot. Calam., Sodii Carb., Zinc Cream, see also Eczema.*

Skin Proliferants.—Allantoin, Acriflavine, Symphytum, Scarlet R.

Skin Sterilisation.—2% *Iodine in* 70% *Alcohol, Mercuric Chloride* 1 *in* 500 *in Spirit, to* 1 *in* 2,000. *Biniodide and Spirit. Eau de Cologne has been used. Alcohol alone is efficient: Perfumed Formosyls, 'Prophyl' Tinct. Iodi.*

Sleepiness.—Tea, coffee, Digitalis, Pituitary or Thyroid suggested.

Sleeping Sickness.—*See* **Trypanosomiasis.**

Sleeplessness.—*See* **Insomnia.**

Small Pox.—*See* **Variola**.

Smell, Loss of Sense of.—Borated Hydrogen Peroxide.

Smoking Habit, Excessive.—*Wash the mouth out with Silver Nitrate,* 1 *in* 250. *Anti-smoking gum. Formosyl Pastils.*

Snake-bite.—Alcohol and Ammonia, Antivenom Serum, Pot. Permang., Strychnine inj., Calcii Chlorid. inj., Tinct. Ammon. Co., Mist. Olea-Balsamica.

Locally.—Chloroform, Chloral cum Camphora, Cocainæ Hydroch. Liquor, Hydrogen Peroxide.

Spray the part with Ethyl Chloride, whilst making incisions and rubbing in Potass. Permang. See also p. 554. Gelatin Inj. for hæmorrhage.

Cocaine Hydrochlor. injected in full doses at the site of puncture caused by fangs of the snake not only relieves the pain, but causes reduction of the swelling if promptly used. Well combined with *permanganate.* Oozing hæmorrhage which occurs from all mucous surfaces is reduced by taking large quantities of *gelatin* solution 5%, per os.—J. C. Fox.

Sneezing, Spasmodic.—Calcii Chlorid *q.v.*

Spasm.—Æther, Ammon. Arom. Spt., Amyl Nitris, Atrop. inj., Belladonna, Benzyl Benzoate, Cajuput Ol., Camphora, Chlorof. and inhaled, Chloromorphiæ Liq., Erythrol Nitrate Tablets, Ext. Grindelæ Liq. (of larynx). Mannitol Nitrate Tablets, Menth. Pip. Ol., Mistura Ætheris cum Ammonia, Opium, Papaverine (Gastric and Intestinal), Piscidia.

Speech Fright.—*See* **Stage Fright,** also **Nervousness.**

Spermatorrhæa.—*See* **Incontinence of Semen.**

Spina Bifida.—Iodo-Glycerin injection. Iodine Liniment.

Sporotrichosis.—Potass. Iodid.

Sprains. *Locally.—Arnica, Fomentations (hot) of Poppy-head or Belladonna, or cold with vinegar, or spirit lotions, Lead and Opium Lotion, Lotio Ammonii Chloridi.* When chronic, *Liniments of Belladonna, Chloroform, Camph. Co., Lin. Tereb. Acet., Radiant Heat, 'X' Rays.*

Spring Catarrh.—See Catarrh, Nasal and Hay Fever.

Sprue.—Calcium and Parathyroid (Harold Scott), Castor Oil, Cyllin, Koumiss, Milk Diet, Pancreas Fresh, Pepsin, Santonin, Ipecacuanha sine Emetina, Strawberry Ext. Ethereal.—Trilactine Milk and Tablets after Milk meal. *Locally.—Formosyl.*

Sodium Bicarbonate 10 to 20 ounces of 2 to 4% solution intravenously slowly in addition to *per os* doses.—A. Castellani, B.M.J. i./21,338.

Hydrochloric Acid, 15 minims of 0·2%, before, and 10 grains of Pancreatin after each meal, no dietary precautions being taken whatever. This treatment has been adopted along the entire coast of Queensland.—S. M. Lambert, per Jl. Trop. Med., Oct. 15/23,323. See also T. R. Brown, *ibid.*, Oct. 16/22,330.

Tropical sprue, closely related to pernicious anæmia, is a deficiency disease in which well-chosen food is of great value.—C. Elders, L. i./25,75.

Stage Fright.—Cannabis with Laudanum. Gelsemium (*q.v.*), Laudanum, Opium Pills, Opium with strong coffee (Morell Mackenzie), also with Sal Volatile and Camphor Water. Three deep inspirations valuable.

Stenosis of Pylorus; Urethra, &c.—Cicatricine, Opii. Tinct. *q.v.*

Sterility.—Ovarian Gland Sicc., Testicular Gland Sicc., Corpus luteum. Certain Mineral Waters are advocated, *e.g.*, Eaux Bonnes.

Stings.—*See* **Bites.**

Stomach Dilatation.—Sodium Phosphate as nervine tonic. As antiseptics, to overcome fermentation—Bismuth Salicylate, Salol, Betol, Benzonaphthol, Eff. Sod. Mag. Aper., Trilactine Milk. See also GASTRIC SECRETION.

Stomatitis.—Hydrastis, Laudanum, Pot. Chloras, Sod. Hyposulph., Sodii Bisulphis, Sodii Chloras.

Locally.—Acid. Boric., Acid. Carbolic, Acid. Picric as paste (stomatitis mercurialis), Acid. Salicylic, Acid. Sulphuros, Alumen, Borac. Glyc. and Mel.

Calcis Aqua, Collutorium Hydrog. Perox., Cupri Sulph., Formosyl Mouth Wash, Hydr. Perchlor. Lotion 1 *in* 5,000 *Iodine Colloidal, Liq. Alum. Aceto Tart. as mouthwash, Myrrhæ et Boracis Tinct., Perfumed Formosyls (diluted), Salol Mouth Wash, Sodii Chloras, Potass. Chloras.—See* **Pastils.**

See abstract of article by Sir K. Goadby, p. 833.

Strictures.—Cicatricine, Radium (œsophageal), Ung. Thiosinamin.

Styes.—Copper Point or Copper Sulphate Solution.

Styptics.—*See* **Hæmorrhage.**

Sunburn.—*See* **Freckles.**

Sunstroke.—Ammon. Carb., Apomorphina, Atropinæ inj. hypod., Bromides, Digitalis, Ergot, Hyoscina, Morphinæ inj., Quinine, Sedasprin, Veratrum.

Purgative enemata, Sinapis Emplastrum.

Sunstroke in the Tropics cured by Pilocarpine hypodermically with 1 or 2 minims of Croton Oil.—J. McOscar, B.M.J. ii./23,310.

Suppuration. Staphylo Vaccine. *Locally.*—Wound remedies, *q.v.*

Sweats.—*See* **Night Sweats.**

Sweating feet.—Alum Acet., Formalin, Formosyl, Pulv. Salicyl. cum Talco.

Sycosis. *Locally.—Arsenobenzol, Bismuth Oleas, Formosyl, Ichthyol Liq. Hydrarg. Perchlor., Hydrog. Perox.* (1 *to* 2 *vol.*), *Iodides externally, Ol., Tereb. in Oil Injectio, Manganese Butyrate, Perfumed Formosyls (diluted), Uranii Oleas, Sulphur, Ung. Cupri Oleat* 10%, *Ung. Hyd. Ammon., Ung. Hydrarg. Nit., Ung. Hydrarg. Sulph. Flav., Ung. Thorii Oleat, 'X' Rays.*

Synovitis.—Ext. Solani Liq. has been advised, Mercurials, Static Electricity.

Syphilis.—Antim. Sodii Tart., Arsamin and other Organic Arsenic Comps., Arsenobenzol alone and with Mercury and Injection of Patient's serum after, Auri Chlor., Barii Chlorid., Bismuth Subnit. Injection, Bismutol and other Bi. Preps. (*watch mouth*), Calc. Iodo-ricinol., Ferri Iodid. Syrup, Hyd. c. Creta, Hyd. Cyanid., Hyd. et Pot. Iodid., Injectio Hydrarg. Intram. and other Mercurials, Iodinol, Iodoprotein, Iodum, Iodine Colloidal, Mercurialised Serum, Mang. Butyrate, Mist. Quin. c. Ferro, Mist. Hyd. Perchlor. Co., N.A.B. (and Guaiacol Glucose Sterules for dissolving). Pot. Iodid. Pil. Quin., Hyd. et Opii, Protargol, Quin. Hydrochlor., Quin. Hydrochlor-Carbamid and Hydr. Perchlor., Quin. Iodo-bismuthate, Quin. Nucleinas, Quin. Periodide, Salicin, Sarsaparilla preps., Sod. Iodid., Syr. Ac. Hydriodici, Tiodine.

Arsenobenzol preparations more efficacious than any other form of treatment available. Care needed in giving.—Med. Res. Com., B.M.J. ii./22,184.

The ***Injectio Hydrargyri Intramusc.*** 10% (*vide* p. 454), is the *standard* preparation.—'Treatment of Venereal Disease in the Army.' *cf.* also p. 199 for *War Office Method.*

For Methods of Diagnosis.—See Vol. II.

Locally.—Arsamin Paste, Hydrarg. Lanolin., Hyd. Oleat et c. Morphina, Hydrarg. Ung., Iontophoresis of Potass. Iod. Solutions. Ung. Prophylaxis (capsules of).

Experiments tend to show Syphilitic re-infection is possible.—B.M.J. ii./21,19.

Spirochætal infections of man.—R. P. Strong, U.F.C., '25,218.

An abstract review of the current literature on syphilis.—Pres., Sept., '27,293.

Syphilitic Sore Throat.—*Locally. Alum Garg., Borax Garg., Chlorine Garg., Colloid Silver, Collutorium Hydrog. Perox., Hyd. Cy. Garg., Hyd. Perchlor. Garg. and Pastil., Pot. Chlorat, Garg. Pastil. and Troch.*

Syphilitic Ulcers.—*Acid. Chromic, Acid Pyrogallic, Arsamin, other Org. Ars. Comps., Collod. Salicyl. c. Hyd. Perchlor., Dusting Powder of Calomel and Bismuth, Hyd. Acid. Nit. Liq., Hyd. Flava and Nig. Lotio, Hyd. Iodas, Hydr. Naphthol, Hyd. Oleat. Morph. etc., Hyd. Subchlor., Collod. Iodof., Iodof. Wool, Ung., Resorcin, Zinci Chlorid. Iodid. and Nitras, Ung. Antimonii, Ung. Arsenii, Anserin, Ung. Iodi Intinct.* Internal Remedies, see Syphilis.

Tabes Dorsalis.—*See* **Locomotor Ataxy.**

Tachycardia.—Amyl Nitrite, Atropine, Cactus, Convallaria, Digitalin, Nitroglycerin, **Parathyroid,** Sparteine, Strychnine.

Tænia.—*See* **Worms.**

Tartar on Teeth, to dissolve.—*Lotio Acidi Citrici et Phenolis.*

Tattoo Marks, to remove.—*Acid. Salicylic, Tannin and Silver Nitrate.—Ac. Nitric. (Ph. Form.), Glycerin Papain (?), Iontophoresis.*

Refs. to Briault's work.—P.J. ii./12,557, see also C.D. ii./12,272.

Tetanus.—Anæsthetics (to relax spasms), ***Antitoxin,*** Amyl Nitris, Bromides, Cannabis, Chloral Hydras, Curara, Luminal-Sodium Inj., N. Saline Injections, Paraldehyde intrav., Parathyroid, Physostigmine, Sodium Persulphate.

Oxidising Antiseptics.—H_2O_2, Permanganate, Chlorine water and Iodine are unfavourable to growth of Tetanus Bacilli, but Phenol, Magnes. Sulph. have no apparent effect.

Curare (*q.v.*) cured after Tetanus Antitoxin failed.

No limit to the total amount of serum that can be given. In treatment, the best drug for painful spasms is Chloretone in 20 grain doses three or four-hourly.—C. Worster-Drought, L. i./26,726.

Tetany.—Parathyroid. Some good results have been reported.—Prof. Swale Vincent, L. i./23,130. Large doses of Calcium Lactate in conjunction.—Davies, B.M.J. i./23,512. Stront. Lactate, Ol. Morrhuæ.

Thirst, to Relieve.—Acid. Citric., Acid. Phosph. Dil., Acid. Sulph. Aromat., Acid. Tartaric., Coca, Formalin Tablets (Internal), Haust. Imperialis, Mucin, Pot. Chlor. Tablets, Pot Cit., Pot. Tart. Acid.

Throat, Inflammation of, and Tonsilitis.—Aconit. Tinct. and Pastil, Aspirin, Ammon. Brom., Antimony, Belladonna, Broadbent's Mixture, Calc. Sulphide, Elix. Sod. Lact, prior to operation, Fe. Salicyl., Formalin. Tablets (Internal), Guaiacol, Lichenoids, Liq. Ferri Perchlor., Phenazone, Quinine HCl. Acid. as spray or paint, Quininæ Salicylas, Salicylates, Sodii Benzoas, Sodii Bicarb., Solubes (various), see Index, Strepto. or other Vaccine, Tab. Formalin (to suck), Tylcalsin, Tyllithin.

Locally.—Adrenalin Spray, Benzoin, Tinct. Vap., Chlorates in Troch., Cocaine (Pigment of), Colloidal Argent and Hydrarg., Guaiaci Troch., Iodi Vapor, Monsel's Sol., Sod. Perbor., Thymaglycine.

Throat, Relaxed Sore.—Ac. Carbol. Pastil., Ac. Tannic Glycerin, Alum and Glyc. Aluminis, Alum Aceto-Tart. Liq. and Alum Format. Liq., Ammon. Chlorid Vapor, Argent. Nit., Benzoin, Tinct. Vap., Bism. Past., Elixir Guaiaci, Ferri Perchlor. Pig., Guaiaci Troch., Hydrastis Tinct., Iodine Colloidal, Lichenoids, Phenoloid Tablets, Pini Sylvest. Vapor, Solubes (various), see Index.

FOLLICULAR TONSILITIS—Eusol. Calcium Sulphide said to be specific.

Thrush.—*See* Aphthæ.

Tic Douloureux.—*See* Neuralgia.

Tinea Favosa and Sycosis. *Locally.—Ac. Carbol. Glyc., Ac. Salicy. Ung. (50%), Acid Sulphuros, Croton Oil, Chrysarobinum, Cupri Oleat. Ung., Ethyl Chloride, Formaldehyde, Hyd. Oleat., Hyd. Iodas, Hyd. Perch. Lotio. Hyd. Perox., Iodi Linim, Petroleum of Commerce, Picrotoxin Pigment, Pig. Acid Picric et Camph., Pyrogallol, Resorcin, Sodii Chloridi Ung., Sod. Hyposulph. Lotio, 'X' Rays, Copper Ionised.*

Apply *Whitfield's Ointment;* Benzoic Acid 1, Salicylic Acid 1, Cocoa Nut oil 12, Vaselin to 30, *or* first mop with Tincture of Iodine, then rub on Silver Nitrate 1, dissolved in Spirit Nitrous Ether 50. Repeat and apply the ointment between whiles.—H. G. Adamson.

Tinea Tarsi.—See **Ophthalmia Tarsi.**

Tinea Tonsurans and Circinata.—Thallium Acetate *per os* (to cause epilation, but we do not advise it).

Locally.—As for **T. Favosa** and—*Colloidal Ag. and Hg., Cupri Oleas, Ferri Perchlor. Liq., Formosyl, Hydrarg. Nit Acid. Ung., Iodi et Olei Picis Pigment, Iodised Phenol, Izal, Sphagnol, Salicylic Acid, Sodii Carb. Cryst. melted hot, Sulphur, Ung. Hyd. Iodid. Rub., Ung. Potass. Sulphurat., Ung. Sodii Chloridi, Ung. Sulph., Naphthol Salicylat, Ung. Thorii Oleat., 'X' Rays.*

TRICOPHYTIN, a product of the State Serological Institute, Vienna, given subcutaneously in addition to the usual treatment (1% hot Resorcin Solution) successfully employed in the treatment of ringworm. Trichon, a polyvalent form of Trichopytin, used for deep cases.—F. J. Novak, per Jl. Trop. Med., June 1/23,197.

Suppurative trichophytosis cured by Gram's Solution, 5 Cc. intravenously, diluted with 20 Cc. of artificial serum; 2 injections given at interval of 8 days.—B.M.J.E. i./24,10.

Dr. Adamson's Ointment consists of equal parts of Sodium Chloride and

Vaseline, and is used after epilation for producing a superficial folliculitis and for bringing out the stumps.—L. ii./27,553.

Tinea Versicolor.—*Acid. Chrysophanic., Acid Sulphuros.. Borac. Glycerin, Colloidal Ag. and Hg., Formaldehyde, Lotio Calcii Sulph., Sodii Hyposulph. Lotio.*

For various forms of tinea the following lotion is recommended. Resorcin 2 drachms, Tincture of Benz. Co. to 1 ounce.—A. Castellani, L. i./20,943.

Ringworm of nails treated by solution of Acid Salicylic 1 drachm in 1½ ozs. Methylated Spirit painted on after scraping every night and without scraping every morning; use three months or longer.—R. Craik, B.M.J. i./20,185.

Epidermophytosis or eczematoid ringworm well treated by swabbings with 1 in 1,000 or even 1 in 5,000 solution of Potassium Permanganate.—L. ii./22,578,

Tinea cruris.—*Ung. Chrysarobin B.P.* will effect a cure in six days if applied thickly on lint twice daily. Salicylic Ointment takes longer. Salicylic Collodion useful for small or scattered lesions.—L. ii./22,791.

Tinnitus Aurium.—Brominol, Iodinol, Pilocarpine Injection.

Inflation of warm air, vapour of chloroform or ether or a few drops of 5% methyl salicylate in parolein through a catheter.—L. i./26,150.

Digitalis in the pulsating form, Bromide (useful at bedtime and often gives great relief), hypnotics, sedatives, Paraldehyde, Potass. Iodide (where associated with vertigo), Pilocarpine (in cases showing Menière's symptoms). *Thiosinamin* (hypod). *Iodum Oleatum.*

Toenail, Ingrowing.—*Lead Nitrate as dusting powder.*

Tonics.—*See* **Anæmia, Debility, Fevers, Rickets, etc.**

Tonsilitis.—*See* **Throat and Pharyngitis.**

Some remote effects of tonsilitis. *Inter alia,* the tonsil is a focus for arthritic infection.—A. B. Pavey-Smith, Pr., April, 22/271.

Chronic tonsilitis treatment. Indications for enucleation.—J. S. Fraser, L. i./26,408.

Toothache—Atropine Methyl Bromide with Aspirin, Pil. Butyl-Chloral Hyd. c. Gelsem., Gelsem. Tinct., Magisal, Piscidiæ Ext. Fluid., Quin. Tinct. Ammon., Sedasprin.

Locally.—Acid. Arsenios., Acid. Carbol. c. Collodion, Benzyl Alc., Butyl-Chloral c. Menthol, Caryoph. Ol., Chlorof. c. Camph., Chlorof. c. Mastic, Cocainæ, Cocaine-Menthol-Eugenol, Cocaine-Menthol-Phenol, Creosotum, Eugenol, Iod. et Aconiti Tinct., Liq. Sodii Carbol., Menth. Pip. Ol., Opii Tinct., Pasta Arsenicalis, Pot. Permang., Pyrethri Tinct., Res. Carbolica, Sod. Peroxidum.

Toothache Remedy.—N.F. 5th Edn. 1926, consists of Cinnamon Oil 10, Phenol 20 and Methyl Salicylate 30.

Toxæmia.—Anti-Gas-Gangrene Serum, Calc. Chlor. intram., Ether, Purgatives, Diuretics, Jaborandi, Sal Volatile, Stimulants, Strychnine.

Toxæmia, Alimentary.—Acid HCl., Emulsio Paraff. et Bismuth, Glucose injections, Kaolin, Charcoal, Liq. Chlori, Trilactine.

Trachoma.—Abrus. Preps—Radium Rays—good results. Acid Carbonic Snow, Copper Sulphate (and Ionisation of), Silver Salts. *See also* Cancer.

In the first stage Silver Nitrate solution 5 to 60 grains per ounce, preferably 10 grains, or Copper Sulphate applied as stick, to the area of the conjunctiva. These are best exposed by ballooning the fornix with subconjunctival injection of Saline, including 4 minims of 4% Cocaine and 4 minims of Adrenalin Solution. Treatment of complications such as trichiasis and pannus, the latter occasionally by peritomy and corneal ulceration by use of Scarlet 2% in Olive Oil are called for later. *Dionine* for promoting absorption of corneal opacities and installation of 5% infusion of crushed Jequirity Seeds are of value. Secondary infection, *e.g.*, by Morax-Axenfeld and Koch-Weekes bacteria are combated with Zinc Sulphate and Silver Nitrate drops respectively. In gonococcal and especially streptococcal infections eye baths of Saturated Magnesium Sulphate Solution are most useful.—Lieut.-Col. H. Kirkpatrick, L. i./21,1304.

Special article. The disease is divisible into four stages, each type requiring special care with caustics—Perchloride, Silver Nitrate, etc.—A. F. MacCallan, L. ii./26,919.

Trichinosis.—Ergota, Ergotin, Liquor Arsenicalis.

Treated by combatting gastro-intestinal symptoms and fever with Bismuth, Salicylates and Quinine. Later, Dimol, when the true nature of the disease had been found. Antimony Tartrate, intravenously, would possibly be of use.—D. A. Rice and co-workers, L. ii./22,799.

Trypanosomiasis and Tick Fever.—Mist. Antim. et Pot. Iod., Methylene Blue.

Locally.—Arsenic (Sodium Arsenate), Arsamin and other org. arsenic comps. q.v., Antim. Oxid. Inj., Antim. Sodii Tart., Auramine (?), Fourneau '309,' *Bayer* '205,' *Novarsenobenzol and injection of patient's serum treated with.*

Tuberculosis, Laryngeal.—*Ac. Lactic Spray or Pigment, Ac. Picric Inhalation, Boric Acid Insufflated, Cocaine (Lozenges and Spray), Eusol, Guttæ Cinnam. Co., Iodoform, Iodine Inhal., Menthol in Olive Oil, Morphine, Pastils of Cubebs, Pot. Chlorate or Ipecac., Silver Nitrate Spray, Tuberculins, Vapor Creosot Co., Vap. Ol. Pini Sylv.*

Tuberculosis, Renal.—Mild 'cystitis' cases should be regarded with suspicion. Surgical methods.—C. A. R. Nitch, L. i./25,1,34.

Tuberculosis.—*See* **Phthisis.**

Typhoid Fever.—Carbo Anim., Cinnamon Oil, Carbolic Acid, Cinchoona Alks., Emetine Hyp., Guaiacol, Hyd. Subchlor, and Perchlor, Hydrog. Peroxide, Iodates, Iodine Tinct., and Phenol dil. to drink, Magnesii Salicylas, Mist. Chlori c. Quin., Naphthalene, Naphthol (*a*), Olive Oil, Phenyl-Aspriodine, Platinum Coll., Salol, Santonin, Sodii Acid. Sulph. as water disinfectant, Sodii Chloras, Soda Chlorinata, Sod. Nucleinate Inj., Sulphur, Sulphurous Acid, Thymol, Vaccines and Sensitised Vaccines, (T.A.B.), also Multiple Vaccines (Castellani), Trilactine Milk, Turpentine Oil (per rectum), Tylcalsin, Tyllithin.

Hæmorrhage, Intestinal from: Calcium Chloride, Crocq's Pill, Argenti Nitras, Ergot, Pil. Plumbi Acetatis cum Opio, Turpentine.

Locally.—Allantoin, Alcohol Compresses, Colloidal Ag. and Hg., Hyd. Perchlor. intrav. For rectal feeding see Enemata.

Heart Failure in.—Caffein Sod. Benz. Camphor, *e.g.*, Curschmann's Solution.

Venous Thrombosis in—intravenously 0.5% Sodium Citrate up to ½ pint.

Typhus.—Sod. Salicyl intrav. See also Vol. II.

Ulcers.—*The following are chiefly for local use: see text. Ac. Boric., Ac. Carbolic., Ac. Chromic., Ac. Lactic, Ac. Salicyl., Alii Succus, Allantoin, Argent. Nit., Bism. Oxyiodid., Borated Hydrogen Perox., Brilliant Green, Calc. Sulphide Stearettes, Carbonis Cataplasm Collodium, Colloidal Metals, Cupri Acet., Cupri Oleat Ung., Elix. Calc. Iodid., Eusol, Fermenti Cataplasm, Formosyl, Glyc. Bellad., Hamamelis, Horse Serum, Hydrogen Peroxid., Iodates, Iodoform, Iodol, Methysal Balm, Naphthalin, Nuclein Inj., Oxygen, Unna's Paste, Pasta Amyli Iodid., Paste Carbonis et Zinci, Parathyroid, Paraffin No. 7, Plumbi Subacet. Glyc. and Ung., Pot. Biborate Solution, Pot. Permang., Radium, Resin Ung. and Res. Ung. c. Chlorof., Resorcin, Salol, Sanitas, Scarlet 'R, Sod Cit. locally to soften, Sphagnum, Strepto. Vaccine, Toluol, Trilactine, Ung. Pheno-Boric., Ung. Pot. Chlorat. et Zinci, Ung. Thorii Oleat., Zinci Chlorid., Zinci Oleat. Ung., Zinc Perox., Zinci Sulph. Solube as Lotio, Zinc and other Ions, Pot. Biborate Solution.*

Tropical ulcers well treated as follows:—Daily bath for 1 hour with Mercuric Chloride 1 in 2,000, followed by Boric fomentations every 4 hours; the following ointment then applied—Zinc Oxide, Salicylic Acid, Ammoniated Mercury Ointment, Vaseline, equal parts. Put on ⅛ inch thick and leave for 3 days without dressing. Leg should be rested. Rapid improvement.—N. Cantlie, Jl. Trop. Med., Feb. 1/23,38.

Ulcer Duodenal.—Cocaine Period., Mist. Bismuthi Phenolis et Morphinæ, Kaolin for lubricant effect. Succus Allii diluted with three times quantity of water.

To counteract constipation resulting from Bismuth give Pil. Hyd. Subchlor., Rhei, Cascaræ et Capsicin. When active symptoms subsided a tonic of Papain 2 grains, Phenol 2 grains, Strychnine $\frac{1}{30}$ grain, Codeine ¼ grain. Rhubarb Ext. ¾ grain.—Guthrie Rankin, B.M.J. ii./10,181. Significance of symptoms in duodenal ulcer.—Mansell Moullin, L. i./12,563.

Ulcer, Gastric.—Aperfine, Argenti Nit., Ferri Perchlor., Gelatin, Glucose, Inf. Symphyti, Kaolin for lubricant action, Mist. Bismuth, Phenol et Morph., Horse Serum, N. Saline Inj., Ol. Olivæ.

(1) promote healing by plenty of nourishing food; (2) "fix" the gastric acid and so prevent it from interfering with healing by ensuring that the food contains a large proportion of protein; (3) prevent distension of the stomach by small feeds. Milk and egg diet supplemented by Iron and Bismuth. Pain disappears early, vomiting quickly subsides and relapses are rare.—Hutchison.

Diagnosis.—*See* Stomach Contents Examination.

Toxic symptoms from very large doses of alkalis in peptic ulcer.—A. F. Hurst, L. i./23,1288.

Neither gastric nor duodenal ulcer, colitis, appendicitis nor cancer in any form seen in the Orange Free State amongst Basuto Negroes. Similar remarks as to the Himalayas and South America.—F. P. Fouché, B.M.J. i./23,1116.

Uræmia.—Aconite. Atropine, Bromides, Caffeine, Cannabis, Digitalis, Elaterin Pulv. Co., Erythrol Nitrate, Hyd. Subchlor., Lithii Hippuras, Nitroglycerin, Papaverine, Parathyroid, Pilocarpine, Saline Purgatives, Saline Solution, Scilla, Sodii Benzoas, Strophanthus, Venesection.

Uræmia and Albuminuria treated by 1 Cc. of 1% *Pot. Permang.* hypod. Almost complete suppression of urine reacted to 10 drops of ½% solution. Some local pain at site of injection, but this is relieved by hot fomentation. —F. V. Davison, L. i./16,430.

Uræmic Convulsions.—Bromides, Chloral (per os or per rectum), Chloroform, Jaborandi, Morphine, Saline Solution, venesection or catharsis, may prolong life.

Urethritis. *Locally.—Argent Nit.* (0·02 *to* 0·1%) *Irrigation or combined with Hydrogen Peroxide* (1 *to* 2 *volume*; *Glyc. Resorcin, Mang. Butyrate (Inj.), Mercurome, Santalol (per os), Turpentine by means of catheter. See also* GONORRHŒA.

Uric Acid Diathesis.—*See* **Gout, Rheumatism.**

Urinary Calculi.—*See* **Calculi.**

Urine, To render Acid.—Aspriodine, Benzoic Acid, Sod. Phosph. Acid (the natural acid of the urine), Salicylic Acid (increases acidity slightly). Large doses of Citric or Tartaric Acid.

Urine, to render Alkaline.—Potassium, Sodium, Lithium, Calcium Tartrates, Citrates and Carbonates.

Post-operative urinary retention treated by emptying the bladder by catheter and giving injection of Glycerin 50 Gm., Boric Acid 5 Gm., Sterilised Water 5 Cc. Power of micturition established in 15 to 30 minutes. Only one failure in 175 cases.—B.M.J.E. i./26,20.

Urine, Blood in.—Ammon. Chlor., Calc. Lactas; Iron Salts.

Urine, Incontinence of.—*See* **Incontinence.**

Urine, Retention of.—Hexamine intravenously.

Urine, Tests for Albumin, Sugar, etc.—See Vol. II.

Urinary Antiseptics, *See* **Antiseptics, Urinary.**

Urticaria.—(For Diagnosis, Protein Skin Tests). Bromides, Calcii Lactas, Cream of Tartar, Elix. Sod. Lact., Ephedrine, Harrogate Water, Magnesia Cream, Manganese Butyrate, Milk and Glycerophosphates, Mistura Alba, Peptone Injections, Pituitary, Sodii Bicarb., Sulphur (Stearettes), Terebene, Trilactine.

Locally.—Acid. Benzoic, Boric., Carbolic Lotio, Hydrocyan. Dil., Chloroform. Cremor Sicc. Preps., Liq. Hamam., Ung. Cocain, Perfumed Formosyls, Plumbi cum Lacte Lotio, Sodii Carb., Balnea, Zinc and Starch Powder.

Uterus, Catarrh of.—*See* **Catarrh, Uterine.**

Uterus, To promote Contraction of.—Cimicifuga. Cornutine, Ergot. Preps., Gossypii Rad. Cortex, Hamamelis, Hydrastis, Pituitary Ext. Liq. (Posterior lobe), Saccharum, Ustilago Maidis.

If *malaria* be diagnosed in pregnancy give Quinine or Quinidine at once—divide dosage into 2½ or 5 grain doses every 2 or 4 hours. See p. 748.

Uvula, Relaxed.—*Locally.—Gargles of Alum, Catechu, Ferric Chloride, Kino, Pigment of Glyc. Tannin, Pot. Chloras, Rhatany, Kino or Tannin Lozenges, Zinc Sulph, or Zinc Chlor. Gargle and Pigment.*

Vaginitis.—*Ovules var. (q.v.), Argent. Proteinas, Formalin Dil. (q.v.), Pess. Ac. Lactic., B. Ac. Lactic Paste in milk freshly made and smeared on, Thymaglycine diluted.*

Varicella.

Chicken pox is air borne. It may uncommonly be conveyed by air on the third day, but apparently not afterwards. See Table of Diseases.

Vesicles should be painted with Iodine from the first; prevents scarring.

Varicose Ulcers.—Calcii Chlorid., Calcii Iodid., Parathyroid Gland. *Locally.—Allantoin, Flavine, Silver Chloride suspension. See also* ULCERS.

Unna's Paste over layers of gauze after packing with Zinc Ointment. A bandage is wound round and at each turn it is painted with Unna's Paste. If possible allowed on for a week—repeat later.—J. Devane, L. ii./27,865.

Varicose Veins.—Tinct. Nucis Vom., Tinct. Hamamelis in Spt., Iodine Injection (Schiassi's Method). Ext. Hamam. Liq. lightly applied.

Quinine Hydrochloride 4 *Gm.*, *Urethane* 2 *Gm.*, water to 30 Cc., intravenously. No harmful effects. See also p. 741.

Sodium Salicylate injections (Sicard and Paraf.) See p. 70.

Mercury Biniodide in syphilitic patients and where veins are refractory to milder injections. Inject at one sitting 1 to 2 Cc. of a 1% solution of Biniodide in 1% Potassium Iodide solution. Toxic and intensely irritating to subcutaneous tissues. No effect may be observed for a week or 10 days.

Glucose, 3 Cc. of a 66% solution; ½ Cc. Glycerin of Phenol; as also Iodine have also been used with good results.—A. H. Douthwaite, B.M.J. ii./26,554, and a brochure 1927 (H. K. Lewis).

Galyl, Kharsivan, Neokharsivan, Novarsenobillon, intravenously (doses and strengths are not stated, but the regular anti-syphilitic course is adopted).—W. M. Borcherds, B.M.J. i./27,375.

Sodium Chloride in 20% solution. After injection, pressure should be applied with a gauze pad for 2 to 4 days.—B.M.J.E. ii./27,80.

New methods and principles in treatment.—A. L. Vischer, L. i./27,223.

Variola.—Hydrarg. cum Creta (*q.v.*) 10 grains *ter die*, appears to abort.

Variola, To prevent pitting.—*Acid. Boric. Ung., Acid. Carbolic Ol., Argent. Nit., Calcis Linim., Collodium, Hydrarg. Ung., Iodine Dilute, Phenol pure, Styptic Colloid., Zinci Oleat. Ung.*

Pot. Permang. (q.v.) Bath 5% *or less. Izal Dilution, Bath of.*

Vasodilators.—Amyl Nitrite Sterules, Benzoates, Erythrol Nitrate, Hippurates, Mannitol Nitrate Tablets, Nitroglycerin Tablets, Sodium Nitrite, Spirit of Nitrous Ether, Thyroid Extract.

Venereal Diseases.—*See* **Syphilis, Gonorrhœa, Chancroid.**

Vermicides.—*See* PARASITES and WORMS.

Vertigo.—Acid. Hydrobromic (with a little Quinine), Adrenalin *per os*, Ammon. Spt. Arom., Aspriodine, Nitroglycerin Tablets, Caffeine, Guarana, Quininæ Valerian, Strychnine, Zinci Valer.

Small doses of Mercuric Chloride are recommended by Sir J. Dundas Grant (v. Pr., Aug., '27,99).

Vincent's Angina.

Vincent's spirochætæ and Fusiform Bacilli—infection of mouth, eyes and penis. Mixture of Arsenic and Ipecac. as also the *Pigmentum Ipecacuanhæ et Arsenici* (*q.v.*) applied to the mouth, cleared up the condition.—F. B. Bowman, L. ii./17,536. *Salvarsan topically* or *thorough irrigation with Iodine. Hydrogen Peroxide Gargle. Trichloracetic Acid* said to be specific.

Voice, Loss of.—Cocaine, C.L.O. Emulsion, Formosyl, Lichenoids, Pastils, Menthol, Ozonic Inhaler, Pot. Permang. Solube, or Solube Phenol, dissolved as gargle, Pot. Chlor. and Borax, Rhatany, Solube Borax Co. Throat Pastilli (Glycogelatin, *q.v.*), Tab. Formalin (to suck).

Amyl Nitrite and other **Vasodilators** in hysterical aphonia.—*Vide* Amyl Nit.

Vomiting.—Acetanilide, Arsenic, Acid. Carbolic, Acid. Hydrocyanic. Dil., Ammon. Bromid., Beef Essence (Brand's), Bisedia, Bismuth preps., Calcii Chlorid., Calcis Aqua, Chloral, Chloroform preps., Coca and Cocaina, Cremor Magnes., Elixir Gentianæ Acidum, Hydrog. Perox., Iodi Tinct., Magnes. Carb., Liq. Morphin. hypod., Nitroglycerin., Nux Vomica, Pot. Bicarb. c. Acid. Citric Mist., Efferves., Sedeff, Sodii Phosph. Eff., Vin. Ipec. in minim doses, N. Saline per rectum. Of infancy, Sod. Bicarb.; of Pregnancy, *see* **Pregnancy.**

Vomiting, Post Operative.—Adrenalin *per os*, Chloretone, Cocaine subcut. See also Vomiting if patient able to take internally. For vomiting after Chloroform,—a few drops of Chloroform on Sugar.

Vomiting, Cyclic or Recurrent.—Glucose Injection, Rectal Feeding.

Sod. Bicarb. 1 dr. in N. Saline intrav.

Cyclic vomiting in children. *Continued* use of Sod. Bicarb., 20 grains twice daily to a child of 3 to 7 years and 25 to 30 grains to older children, in 3 tablespoonfuls of cold water. Milk should be reduced to a minimum and cream avoided altogether.—G. F. Still, L. i./23,1328.

Habitual vomiting in infants cured by Lactate of Mercury.—Dorlencourt, per Clin. Jl., July 25/23,352.

Warts and Corns.—Lime Water internally.

Locally.—Ac. Acetic Glac., Ac. Carbol. Ac. Nitric, Ac. Chromic., Ac. Picric, Ac. Trichloracetic, Arg. Nit., Carbonic Acid Snow, Collodium Callosum, Collod. Salicyl, Collod. Salicyl. c. Ac. Lactic, Formalin, Glyc. Papain, Hydrarg. Nitras, *Ol. Cinnam., Iodi Linum., Liq. Arsenicalis, Paraform Collod., Potassæ Liquor, Radium, Liquor Sodii Ethylat., Magnesium, and Zinc Ions, 'X' rays.*

Calcium Carbonate or Phosphate 2 parts, Hydrous Wool Fat 3 parts, applied over a period of 4 to 6 weeks, is said to have been effective.

Water Purification.—Antityphoid Tablets, Copper, Iodine, Permanganates, Potassium Iodate, Sodium Persulphate and Acid Sulphate.

Wax in the Ears.—Ol. Amygd. then syringe or Hyd. Perox. or diluted c. equal vol. of Glycerin, syringing afterwards, Glyc. and Sod. Bic. Saturated Solution.

Whitlow.—Hydrog. Perox., Mang. Butyrate.

Whites.—*See* **Leucorrhœa.**

Whooping-Cough.—Ac. Benzoic and Benzoates, Ac. Carbolic, Ac. Hydrocyan. Dil., Adrenalin, Allii Succus, Alumen, Amyl Nitris, Apomorphine (minute doses), Atropine, Atropine Methyl Bromide, Belladonna (almost specific), Benzol, Bromides, Bromoform Ether injection into the buttock (children under 1 year 1 Cc.), Bryonia, Caffeine Tri-iodide Pil. (Billimoria), Calcis Aqua, Calc. Sulphid., Benzyl. Benzoate, Camphor Elixir, Camphora Monobrom., Chloral, Cocaine HCl. (*on the basis of one grain thrice daily for an adult*), Codeine Jelly, Conium, Gelsemium, Glycaphorm, Grindelia, Hexamine, Iodine in small doses, Ipecac., Lobelia, Morphine, Ol. Succini, Oxygen inhalation, and with Alcohol, Ozonic Ether, Papaverine, Phenacetin, Phenazonum, Pot. Brom., Quinine, Senega, Sodii Benzoas, Stramonium, Syrup Thymi, and Ext. Liq., Syr. Pini Terp. Heroin, Tab. Formalin (to suck), Vaccines, Thymaglycin, 10 m. doses for children diluted useful.

Argent Nit. 2% *as Pigment, Ethyl Iodide Inhaled, Oxygen subcutaneously* (L. i./27,89), *Pigment Cocaine et Hyd. Perchlor., Succini Ol. as Liniment, Vapor Coninæ, Fumigate room with Tricresol or Sulphurous Acid, Resorcin as Nebula, Trichloracetic Acid, Vapor and Liniment Terebeni., 'X' Rays.*

Croton Oil 1 ounce, Cantharidin 3 grains, Strong Acetic Acid 1 drachm, Almond Oil to 8 ounces painted weekly back and front for whooping cough. Aborts within 14 days.—W. J. Midelton.

Full doses of Carbolic Acid, Belladonna and Ipecac. with 1 m. a day for each year of child's age of Adrenalin Solution.—B.M.J. ii./21,224.

A mixed vaccine usually beneficial. Small dose of Belladonna, Bromide, and, if severe, Morphine and Antipyrin. In later stages, where there is no bronchitis, Benzyl Benzoate.—T. Izod Bennett, L. i./23,198.

Worms (Intestinal):—

Ankylostoma Duodenale* (*Hookworm*). *See Ankylostomiasis.

Ascarides (Threadworms).—Acid Carbolic 2 grains ½ hour *ante cib.* and Ung. Hyd. to rectum for a few nights. Alum. Subacet., Carbon Tetrachlor. Chenopodium Oil, Enemata Aloes, Sodium Chloride, Salicylic Acid, Thymaglycin, Thymol or Quassia, Quassia, Suppositories. Filix Mas has cured.

Chloroform 3 to 4 Gm. kills the parent organisms and prevents development of ova. May well be combined with *Castor Oil* or Olive Oil. Effective against ascarides, as also against *Ankylostoma, Oxiurides,* and *Tricocephalus.*

Acute ascariasis associated with trichuris trichiuria (*whip worm*). Santonin and Salol effectual.—C. Russell Corfield and B. Hirson, L. i./22,995.

Methyl Salicylate possesses well marked anthelmintic properties (Hookworm). Most of the worms expelled dead, though it does not remove Ascaris or Trichuris—no after-effects. Salicylic Acid and Salol ineffective.—J. F. Caius and K. S. M. Lasker, per T.D.B. 19/22,662. Methyl Aspriodine should be tried internally.

Ascaris lumbricoides infection and Strongyloidosis treated with Santonin or Oil of Chenopodium.—N. Cantlie, Jl. Trop. Med., Feb. 1/23,42.

Lumbrici (Round Worms).—Areca, Calomel, Chenopodium, Jalap, Naphthalene, Santonin (with garlic draught), Spigelia, Conf. Santonin Comp., Turpentine.

Tœnia (Tapeworm).—Calomel, Cousso, Filicin, Filix Mas, Kamala, Oleum Terebinth c. Ol. Ricini, Pelletierine, Pepo, Thymol, Terebene.

Parasitic intestinal worms—prevalence of, during the war. The commonest were *A. lumbricoides* and *Trichuris trichiuria* but the tapeworm *Hymenolepis nana* also occurred. Latter is common in S. Europe and U.S.A. A vast literature has accumulated on the subject.—W. Nicoll, L. ii./22,1049.

Trichuris trichiuria effectively treated with Thymol or Oil of Chenopodium, —N. Cantlie. Jl. Trop. Med., Feb. 1/23,42.

Propenyl Phenols are good anthelmintics. Substances containing free Phenolic Hydroxyl act both as vermicides and vermifuges. Etherification weakens or destroys vermifugal power and occasionally modifies vermicidal action.—J. F. Caius and K. S. M. Laskar, Jl. Trop. Med., Feb. 1/23,49.

Many of the above drugs may be prescribed as *Stearettes* or *Formagules, q.v.*

Man as the intermediate host of *Tænia Solium* (pork tape-worm) recognised in the aberrant *Cysticercus Cellulosæ* stage by X-Rays.—E. J. H. Roth, B.M.J. ii./26,470. *See also* J. F. Brailsford, B.M.J. ii./26,579. A case of extensive somatic dissemination of C. Cellulosæ in man.—R. Priest, B.M.J. ii./26,471

For recent work on parasites with Carbon Tetrachlor., see p. 274.

Wounds.—*Allantoin, Aseptafilm (applied as covering), Brilliant Green, Chloramine-T., Collodions, Cyanide Paste, Dakin's Solution, Dibromin, Eusol, Formalised Gelatin, Glucose Powdered, Hydrogen Peroxide, Iodine Tincture, Kelly's Paint, Liq. Alum Acet., Mastiche Benzol, Petrolatum Iodi, Mercuric Chloride or Biniodide Lotion, e.g. from a "Solube"* 1 *in* 2,000 *Mercurome.—Bandages, Gauzes, Lints, Wools medicated with Boric Acid, Carbolic Acid, Iodoform, Mercuric Iodide, Mercuro-Zinc Cyanide, Picric Acid, Thymol Iodide, etc.*

See also Antiseptics. For *Skin Sterilisation.*—See Iodum, p. 518, and Sublimate, p. 470, Mercurome, p. 480.

For the last 10 years Sir J. Bland Sutton says he has abandoned dressing dry wounds—wounds, that is, where there is no leakage of blood, serum, saliva, cerebro-spinal fluid, bile, urine, pus, or fæces. Where drainage is unnecessary, dressings are unnecessary. Once daily the line of incision and the sutures are ***smeared lightly with Tincture of Iodine*** or similar antiseptic and ***left exposed to air,*** or merely in contact with clean underclothes. Results are excellent. The wound heals rapidly, safely and soundly, with minimum discomfort and minimum expense.—B.M.J. ii./25,826.

Medico-legal aspect of *Wounds.*—Sir Bernard Spilsbury, L. i./25,421,480,749.

Wounds in War.—We dealt fully with this matter in the Seventeenth Edn., p. 1015, *et seq.* The salient points are now incorporated in the body of the book.

"Back to Lister."—A discourse on antiseptic surgery.—Sir Rickman R. Godlee, B.M.J. i./15,515. Lister's Strong Antiseptic Mixture consisted of Carbolic Lotion 1 in 20 containing 1/500th part of Corrosive Sublimate. Employed successfully for washing out recesses of wounds.—Arthur Edmunds.

Hydrargyri et Zinci Cyanidum. Cyanide Gauze.

'Quite good for visible clean wounds.'—A. Don, B.M.J. i./16,648.

Dry Cyanide Gauze also found excellent for 'suppurating abrasions, boils and skin affections.'

Iodine. Wounds in naval warfare are frequently septic owing to the circumstances. In the 'Tiger' routine practice was first to wash with soap and water. After removing all foreign matter to dehydrate by flooding with S.V.M. and then sponge with 10% dilution of Tincture of Iodine in Methylated Spirit and insert drainage tubes and then cover with gauze.—B.M.J. ii./16,598. Some say it is irritating, and that the pain continues for some time, but we do not think this is generally acknowledged.

Yaws.—Arsenobenzol, Novarsenobenzol, Salfarsenol, and Silver Salvarsan. Bismuth Compounds injected.

Sodium Bicarbonate in 1 drachm doses together with Copper Sulphate locally. Potassium Iodide 10 to 20 grains for adults, 2 to 5 grains for children thrice daily. If anæmic Ammonio-Citrate of Iron. *Locally.* Mercuric Nitrate Ointment (1 in 3 Soft Paraffin).

See also Frambœsia.

Yellow Fever.—Serum of Convalescent Patients tried. *See* Vol. II.

Zoster.—*See* Herpes.

ANTIDOTES TO POISONS.

Fuller information regarding many of the following is provided in the body of the book.

Acetanilide.—*Emetics. Inhalation of Ether and Oxygen.—Stimulants, e.g., Brandy, Coffee, Strychnine.*

Acetylene.—*As* **Carbon Monoxide.**

Acid Carbolic.—Saccharated Lime Water is best from the chemical standpoint. *Magnesium Sulphate or Sodium Sulphate (latter in preference)* $\frac{1}{2}$*oz. in* $\frac{1}{2}$ *pint or more of warm water is wrong theoretically. Soft stomach tube with utmost caution. Apomorphine as emetic, but it does not always 'act.' Egg White, Stimulants, Oil, Weak Iodine Tincture, within limits give same quantity of Tincture of Iodine as of Liquid Phenol taken, Saline transfusion. See p.* 13.

*Camphor taken by the mouth stated to be valueless in Phenol poisoning.—P.J., i./*25,470.

*Sulphates, e.g., Magnesium Sulphate, render inert all Carbolic Acid with which they come in contact. Till Sulphates in the body are overcome the Carbolic group cannot act on the tissues.—E. B. Leech, L. i./*27,453.

Acid Carbolic Burns on Skin, see **Burns** Therap. Index.

Acid Cresylic, *see* **Acid, Carbolic.**

Acid Hydrochlor.—*Alkalis, Chalk, Carron Oil, Lime Water.*

For acids squirted in the eye, douche well with weak Carbonate of Soda solution or 0·5% *Caustic Potash and plenty of water. To prevent sepsis use Sublimate* 1 *in* 6,000.—*E. Clarke, Pr. July.,* '27,30.

Acid Hydrocyanic. ***Symptoms.***—*Giddiness, staggering, insensibility eyes fixed and glistening, pupils dilated, violent gasping for breath, panting respiration. The poison is readily eliminated by the breath so if life can be maintained for even half an hour recovery is probable. Inhalation is as dangerous as swallowing or even local application or dropping in the eye.*

If seen in time, stomach tube or emetic. Stimulants, Ammonia (inhale), Sal Volatile ad lib. If patient cannot swallow give brandy as enema or hypodermically. Alternate hot and cold douches, artificial respiration about 20 *in the minute, Atropine hypodermically, or* 30 *drops of Tinct. Bellad. per os, repeated. See also Potassium Cyanide.*

Acid Nitric.—*As* **Acid Hydrochlor.**

Acid Oxalic.—*The best is a mixture of Chalk (Whiting) and Saccharated Lime Water; subsequently stomach tube. Do not give Soda or other Alkali. Barts. Apomorphine, Castor Oil.*

Acid Phosphoric.—*As* **Acid Hydrochlor.**

Acid Sulphuric.—*Magnesia and other alkalis (Lime), Carron Oil.*

Aconite.—*Apomorphine, Stimulants, Amyl Nitrite, Atropine Sulph.* $\frac{1}{50}$ *grain hypod. Digitalis Tincture,* 20 *minims hypod. Keep patient lying down.*

Aconite and Belladonna *(as Liniment).—Emetics, Stimulants freely—if not retained, dilute and give per rectum. Warmth.—Murrell.*

Æthyl Chlorid.—*Weak Ammonia Vapour. Hot flannels to heart. See also* p. 111, *or proceed as under Chloroform,* p. 286.

Alcoholism Acute.—*Empty stomach by syphon or stomach-pump or injection of* $\frac{1}{10}$ *grain apomorphine, wash out and fill with strong coffee, Amyl Nitrite Inhalation, heat to extremities, counter-irritation and injection of* $\frac{1}{10}$ *grain Strychnine.—Whitla Pract. Med. Powdered charcoal* $\frac{1}{2}$ *ounce in water is efficacious.*

Alcohol Methylic.—*As preceding.*

Alkalis Caustic.—*See* **Potash Caustic and Ammonia.**

Alkaloids.—*Emetics, Tannic Acid, Potass. Permanganate, Amyl Nitrite. See also alkaloid in question.*

Charcoal, a tablespoonful or larger doses frequently repeated, seems to have a special attraction for alkaloids. Animal charcoal is the best form.—Hale White. It should be given at once suspended in water and pumped out again. The absorption is almost instantaneous. Afterwards rinse out with water containing the ordinary antidote, and then a suspension of Charcoal and Magnesium Sulphate if a purge is not contraindicated. Has also been used in Phosphorus, Mercuric Chloride, Paris Green and Phloroglucin poisoning.

Ammonia.—*Vinegar well diluted, Lemon or Orange Juice, Acetic Acid. Tracheotomy may be necessary. Bronchitis kettle, Morphine.*

Amygdalæ Amaræ Oleum Essentiale *vide* **Acid Hydrocyanic.**

Aniline.—*Emetics, artificial respiration, fresh air, oxygen, bleeding or transfusion.*

Antifebrin.—*See* **Acetanilide.**

Antimony Compounds.—*Strong Tea or Tannin Solution* (30 *grains in warm*) *water*). *Repeat as often as vomiting occurs. When this subsides give white of egg in milk or water. Stimulants, Morphine when all symptoms subsided.*

Antipyrin.—*See* **Phenazone.**

Aqua Fortis.—*As* **Acid. Hydrochlor.**, *q.v.*

Arsenic.—***Emetics*** **(wash out stomach with warm water).** *Antidotum Arsenici, p.* 180, *or if not ready, Liquor Ferri Dialysatus ad lib. or Magnesia ad lib.*

Aspirin.—*Swelling of face and tongue occurs very occassionally.—Sod.-Bicarb.*

Atropine.—*Emetics, stimulants with Morphine or Pilocarpine,* ½ *grain repeated.* (*The latter is doubtful.*) *See also Alkaloids.*

Barbitonum, *See* **Veronal.**

Barium Chloride.—*Emetics Sodium Sulphate.*

Battery Fluids.—*See* **Acid Sulphuric.**

Battley's Solution.—*See* **Morphine.**

Belladonna.—*See* **Atropine.**

Benzol.—*Emetics, Artificial Respiration, Douche with alternately hot and cold water over chest from a height, Stimulants.*

Biniodide of Mercury.—*e.g., in Antiseptic Tablets taken in error.—See* **Hydrargyri et Potassii Iodidum.**

Blistering Fluids.—*As* **Cantharides.**

Bromine.—*See* **Chlorine.**

Butter of Antimony.—*Vide* **Antimony.**

Butyl-Chloral Hydrate.—*Emetics, Caffeine, Coffee, Atropine.*

Caffeine.—*Stomach tube, Emetics, Nitroglycerin, Apomorphine. Hypodermic Injection of Morphine* ½ *grain with Atropine* $\frac{1}{50}$ *grain. See also* p. 249.

Calabar Bean.—*See* **Physostigma.**

Camphor (*and Camphorated Oil*).—*Emetics, Stimulants, Caffeine injection.*

Cannabis.—*Stomach tube, Emetics, Stimulants, Artificial respiration.*

Cantharides.—*If seen early, Stomach tube. Emetics. If mucous membrane much blistered give White of Egg in barley water or thick gruel—no fat.—Barts. Morphine if much pain.*

Carbolic Acid.—*See* **Acid Carbolic.**

Carbon Monoxide and Dioxide.—*Artif. respiration, Oxygen, Stimulants.*

In Carbon Monoxide poisoning.—Bleeding has been recommended in all cases unless contraindicated by the general condition.

The quickest and most effective for Carbon Monoxide is Oxygen mixed with about 5% CO_2 *through a mask, or make patient inhale as much as possible of expired air of another person.—J. S. Haldane, B.M.J. i./*26,35; *see also Y. Henderson, ibid. i./*26,41-46.

*The possible presence of Nitric-oxide-hæmoglobin must be considered in suspected cases of CO. poisoning. Boil a watery solution of the blood. If red colour and other chemical reactions or spectroscopic appearances are due to Nitric oxide-hæmoglobin, coagulum will be pink.—H. A. L. Banham, J. S. Haldane and T. Savage, B.M.J. ii./*25,189.

Caustic Potash, etc.—*See* **Potash.**

Chloral and Chloralamide.—*Keep patient awake, Strong Ammonia to nostrils, stomach tube or emetics at once followed by Amyl Nitrite, Coffee, Oxygen, Picrotoxin, Strychnine* $\frac{1}{25}$ *grain, repeated if necessary in* ½ *hour. Artificial Respiration on slightest sign of failure continued some hours if necessary.*

Chloral and Morphine (*Combined*).—*Stomach pump or emetic.* ***Arouse patient, but not to walk about. Ammonia to nostrils, cold then warm douche to*** *head and chest. Atropine* $\frac{1}{25}$ *gr. hypod. repeated. Strychnine* $\frac{1}{25}$ *gr. hypod. if Chloral symptoms predominate.*

Chlorine and OTHER IRRITANT GASES.—

ALCOHOL (*Whisky, Brandy, etc.*) *to be inhaled from a cloth soaked with it as with Ether in addition. We have found this good.—W.H.M.* SODIUM BICARBONATE *about* 10% *solution inhaled through a respirator better than alcohol per os. Inhalation of Dilute* AMMONIA OXYGEN *subcutaneously into loose tissue.*

OXYGEN *inhalation by passing a tube connected with a gas cylinder to the back of patient's mouth and opening and shutting the tap about* 15 *to* 16 *times a minute,* *but it may only cause further irritation. For the cardiac weakness* CAMPHORATED OIL *subcut.* EMETICS *have proved useful.* ½ *pint of* SALT AND WATER *or* 8 *grains of* COPPER SULPHATE *followed by large draughts of lukewarm water.* PILOCARPINE *should be injected to promote shedding of the epithelium—if this is not efficacious use* POTASSIUM IODIDE. *Simultaneously Morphine.—J. B. Berkart.* LIQUOR ATROP. SULPH. 9 *minims, Water to* 6 *ounces. Dose.*—½ *ounce. Removes tightness across chest.* WARM AQUEOUS VAPOUR *is a good sedative. Subsequently ordinary methods of treatment of acute bronchitis.* SODIUM HYPOSULPHITE *in respirator solution.* VENESECTION *advised.—Sir E. Sharpey Schafer.*

Fumes from **Explosives** *in mines, accidents from.*

In all cases first produce emesis (APOMORPHINE HYPOD.), *then stimulants* AMMONIA *or preferably* PITUITRIN.—*L. G. Irvine, B.M.J. i./*16,162.

Dichlor-ethyl-Sulphide (MUSTARD GAS, YPERITE) **Phosgene,** *and other gas poisonings.—B.M.J. ii./*18,138.

The first mentioned, though usually called a gas, is an oily liquid which rapidly soaks clothing and causes blisters difficult to heal. The effect is a delaying one, and is more marked on moist surfaces, e.g., from perspiration at the axillæ and fork. We had occasions during the war to make preparations to be used to counteract effects—an OINTMENT OF CHLORINATED LIME *seemed best. Iodine Picric Acid and others were tried.*

Use Sod. Bicarb. Sol. 1% for eyes.

A sulphur compound allied to Mustard Gas, which produces acute œdema of the lungs when injected intravenously.—B.M.J. i./23,819.

In treatment of the painful lesions apply any soothing application and inject 1% Manganese Butyrate 1 to 2 Cc. intram. on 3 occasions at 4 days' interval.—J. E. R. McDonagh, Brit. Jl. Derm. and Syph., Feb., 1924.

Nitrogen Peroxide *and other gases.*—SODIUM CARBONATE 20% *solution.*

Mustard Gas caused 150,000 *casualties in the British Army alone; under* 4,000 (*or* 1 *in* 40) *died, while about* 700 *were rendered permanently unfit. It is, however, one of the least lethal methods of putting an enemy out of action.—Review of Chemical Warfare, B.M.J. i./*25,847.

*The late effects of poison gas.—L. i./*26,1213.

Bromine.—*We have found both dilute* NH_3 *and Alcohol Inhalation good. Treatment; with animal expts.* STRAMONIUM *fumes good.—W. L. Symes, B.M.J. ii./*15,12.

Chlorodyne.—*As* **Morphine,** *q.v.*

Chloroform Inhalation.—*Amyl Nitrite, Artificial respiration*—*see* p. 286. *Inversion of the body. Strych., Caffeine or Adrenalin Injections, the last into the heart or intravenously.*

Chloroform (*Swallowed*).—*Amyl Nitrite. Stomach tube or Emetic. Large draughts of water containing Sodium Carbonate, say* 1 *drachm in* 1 *pint. Lavage with warm oil, e.g., Olive, Almond, Sesame, then Saline transfusion.*

Coal Gas.—*As* **Carbon Monoxide.**

Cocaine.—*Stomach tube, Amyl Nit., Ether hypod.* (5 *min.*). *Strychnine hypod.*

Codeine.—*As* **Morphine,** *q.v.*

Colchicum.—*Evacuate the stomach, Demulcents, White of Egg, Stimulants.*

Colocynth.—*Spirit of Camphor, Laudanum, Stimulants, Strong Tea, Opium Enema.*

Condy's Fluid.—*See* **Pot. Permanganate.**

Conium.—*Stomach tube, Emetics, Tannin, Stimulants and Artificial respiration.*

Copper Salts.—*Stomach tube, Emetic, White of Egg, Milk, hot fomentations to stomach.*

Corrosive Sublimate.—*See* **Hydrargyrum.**

Creosote.—*As* **Acid Carbolic,** *q.v.*

Curare.—*Artificial respiration, Stimulants freely—see text.*

Cyanides.—*See* **Acid Hydrocyanic and Potass. Cyanide.**

Dial.—*As* **Veronal.**

Digitalis.—*Emetics, Aconitine Nitrate* $\frac{1}{120}$ *grain hypod,—repeated in* ½ *hour, or Atropine* $\frac{1}{200}$ *to* $\frac{1}{100}$ *grain hypodermically. Tannin, Camphor, Nitroglycerin, recumbent position.*

Dover's Powder.—*As* **Morphine,** *q.v.*

Emetics are :—*Ipecacuanha in powder* 30 *grains or* ½ *to* 1 *oz. of wine. Apomorphine* ($\frac{1}{10}$ *to* ½ *grain hypodermically*), *strong Salt solution* (*tepid*), *Olive* *oil, Copper sulphate (2 to 8 grains in water), Tartar Emetic ($\frac{1}{2}$ to 1 grain), Mustard 1 tablespoon in $\frac{1}{2}$ pint of water. Zinc Sulphate* 30 *grains in water.*

Ergot.—*Stomach Tube, Emetics, Purgation with Castor Oil or Mag. Sulph., Tannin, Stimulants, e.g., Amyl Nitrite, Nitroglycerin $\frac{1}{50}$ gr. Patient to lie down.*

Exalgin.—*As* **Acetanilide.**

Foxglove.—*See* **Digitalis.**

Fungi.—*A large proportion of deaths are due to Amanita phalloides, which peels like a common mushroom, but has bulbous part at base of stem, also yellowish green colour at edges and white gills; it grows beneath trees; the poison is a toxalbumin—Phallin, not an alkaloid. Stomach pump and Emetics (Ipecac.* 25 *grains or Salt Solution), Castor Oil, Atropine and Belladonna, Brandy, Spirit of Chloroform, Sal Volatile, Morphine for the pain, and administer normal Saline. Potassium Permanganate has been suggested to decompose any Phallin left in the stomach.*

On no account give Tartar Emetic where there is contraction of jaw muscles, or in the case of children. Apomorphine $\frac{1}{3}$ gr. (or $\frac{1}{20}$ grain or less for a child) may be preferable. Give any purgative (not senna or jalap). If delirium and convulsions set in ether or chloral may be necessary (the latter may also be given in Enemata). Finally for abdominal pain Morphine or opium, but always begin with an emetic.

Mushroom poisoning. Recurrence of symptoms after 8 *months, though no mushrooms eaten in the interval. Case described.—Leader, Jl. Trop. Med., Mar.* 15/23,94. *See also Aug.* 1/22,249.

Gases, *see* **Chlorine** also **Carbon Monoxide, Nitrous Oxide.**

Gelsemium.—*Emetics, Atropine or Strychnine hypodermically, also Nitroglycerin or Amyl Nitrite. Artificial respiration, Stimulants.*

Heroin. *See* **Morphine.**

Hydrargyrum (*Mercurial Salts*).—*Emetics, Apomorphine, White of one Egg for every* 4 *grs. of Perchloride (avoid excess), then Stomach tube or Emetics, Reduced Iron, Alcohol or Ether for collapse. (Carron Oil made with Cod Liver Oil was given on one occasion where* 43$\frac{1}{2}$ *grains had been taken.)* Charcoal, *cf.* Alkaloids. See also p. 467.

Hydrarg. Potass. Iodide (*Biniodide Antiseptic Tablets taken in error*).—*Olive Oil, Milk, White of Egg, Petroleum Emulsion, warm draughts.—See p.* 464.

Hyoscine.—*Emetics, Pilocarpine Injection.*

Hyoscyamus.—*Vide* **Atropine.**

Hypnotics.—*Vide* **Drugs in question.**

Iodum.—*Stomach tube, Emetics (Apomorphine), Starch, Saccharated Lime Solution, or Sodium Hyposulphite, Demulcents—finally Opiates.*

Jaborandi.—*Atropine $\frac{1}{50}$ grain hypodermically or* 30 *minims of Tincture of Belladonna at once arrests symptoms.*

Laudanum.—*As* **Morphine,** *q.v.*

Lead.—*See* **Plumbum.**

Lime in the Eye.—*Put in Milk or Lard or Saturated Sugar Solution and douche the eye with* 10% *Neutral Ammonium Tartrate Solution. To prevent sepsis* 1 *in* 6,000 *Sublimate.—E. Clarke, Pr., July,* '27,30

Luminal. *See* **Veronal.**

Lunar Caustic.—*As* **Silver Nitrate.**

Lysol.—*See* **Acid Carbolic.**

Matches.—*As* **Phosphorus.**

Mercury.—*See* **Hydrargyrum.**

Monkshood.—*See* **Aconite.**

Morphine.—*Keep patient awake. Emetic first (Apomorphine $\frac{1}{10}$ grain,—vomiting is induced with difficulty), then stomach tube even if Morphine taken hypodermically. Wash out stomach with Potass. Permang.* 10 *grains in half a pint of Tepid Water (Morphine, even when given subcutaneously, is partly eliminated by the stomach lining). Saline Transfusion, Stimulants. Hot and cold Water poured on head alternately, drying in intervals. Ammonia to the nose, Strychnine, Atropine, $\frac{1}{20}$ grain hypodermically, or if not at hand* 30 *m. Belladonna Tincture for every grain of Morphine, artificial respiration or Oxygen if necessary —Murrell. Carbo Animalis often repeated, cf. Alkaloids.*

Mushrooms.—*See* **Fungi.**

Mustard Gas.—*See* **Chlorine.**

Nepenthe.—*See* **Morphine.**

Nickel.—Purgation.

Nicotine.—*See* **Plants, Unidentified.**

Nightshade—*See* **Atropine.**

Nitrobenzol.—*See* **Oil of Mirbane.**

Nitroglycerin (*as used in blasting work*).—*Maintain recumbent position. Apply ice to the head, give Ergot per os or hypod.—Murrell.*

Nitrous Fumes.—*See* **Carbon Monoxide** and **Chlorine.**

Nitrous Oxide (*Dental*).—*Vide page* 146.

Novocain.—*As* **Cocaine.**

Nux Vomica.—*See* **Strychnine.**

Oil of Mirbane.—*Copper Sulph.* (2 *to* 8 *grains*), *or other Emetics, Stimulants, Atropine, Artificial Respiration, Calomel, Bismuth.*

Oil of Vitriol.—*See* **Acid Sulphuric.**

Opium.—*See* **Morphine.**

Paraffin (Paraffin Oil of Commerce).—*Stomach tube or Emetic.*

Paraldehyde, *See* **Chloral.**

Paregoric.—*See* **Morphine.**

Paris Green.—*Charcoal, cf. Alkaloids.*

Petrol Poisoning.—*Fresh air and warmth, Camphor injections, Oxygen.*

Phenacetin.—*Stimulants: Brandy, Coffee, Strychnine.*

Phenazonum.—*Brandy, Ether, Strychnine, Oxygen.*

Phloroglucin.—*Charcoal, cf. Alkaloids.*

Phosgene.—*See* **Chlorine.**

Phosphorus.—*Oil of Turpentine has been recommended but not other oils, Potass. Permang. Solution* 1% *per os. Murrell advises* 3 *grains Copper Sulphate every five minutes until vomiting is induced. To be continued* 1 *grain every fifteen minutes with a little Morphine if rejected. Epsom Salts as purgative. Charcoal, cf. Alkaloids.*

Oxidising agents, *e.g.*, weak Hydrogen Peroxide, may be given.—E. B. Leech, L. i./27,453.

Physostigma.—*Emetics as Mustard, Zinc Sulphate, Apomorphine, Pot. Permang. by stomach tube, Atropine* $\frac{1}{50}$ *grain, or in bad cases Strychnine* $\frac{1}{12}$ *grain hypodermically, stimulants freely.*

Pilocarpine.—*See* **Jaborandi.**

Pit Gas.—*See* **Carbon Monoxide.**

Plants, Unidentified.—*Stomach tube, Emetics, Aperients, Treat symptoms, Artificial respiration.*

Plumbum.—*Emetics (Zinc Sulphate or Ipecacuanha) stomach tube, dilute Sulphuric Acid* ½ *drachm in water; Magnes. or Sodium Sulph., Poultices to abdomen; Morphine hypodermic. for pain. See also Plumbum in text.*

Potassium Bichromate.—*Emetics, Mag. Carb., Barley Water, Arrowroot or thick Gruel and stimulants.*

Potash, Caustic.—*Dilute Vegetable Acid, Fixed Oils.* **Not** *stomach tube.*

Potassium Chlorate.—*Stomach Tube, Emetics. Stimulants.*

Potassium Cyanide.—*Ferrous Sulphate Solution, large draughts, stomach tube, Emetics, Stimulants, Artificial respiration.—See also* **Acid Hydrocyanic.**

Martin's Antidote consists in formation in the gastro-intestine of Prussian Blue. Thus 30 Cc. of Ferrous Sulphate Solution 23% strength, 30 Cc. of Caustic Potash 5%, and 2 Gm. of Magnesia; the two former to be kept in sealed ampoules, to be mixed and taken immediately.—B.M.J. i./13,271.

Potassium Nitrate.—*Stomach tube or Emetics, Mucilaginous Drinks. White of Egg, Stimulants, Atropine if sign of heart failure.*

Potass. Permanganate.—*Lavage of Stomach, Warmth, Strychnine hypod.*

"Ptomaines."—Finely powdered Charcoal is suggested as a suitable antidote after eating tainted or suspicious food (as under Fungi).

Rat Paste.—*See* **Phosphorus** *or* **Arsenic.**

Red Precipitate.—*As* **Hydrarg.** *Give White of Egg freely followed by lavage of stomach.*

Salt of Sorrel *or* **of Lemons.**—*See* **Acid Oxalic.**

Savin.—*See* **Plants, Unidentified.**

Scopolamine.—*See* **Hyoscine.**

Sewer Gas.—*See* **Carbon Monoxide.**

Sheep Dip.—(?) **Arsenic.**

Silver Nitrate.—*Common Salt in demulcent drink (avoid excess), White of Egg, Milk.*

Stings, Wasp, Bee, etc.—*Ammonia or any Alkaline Solution. See also Therap. Index,* BITES AND STINGS.

Stramonium.—*See* **Atropine.**

Strophanthus.—*After evacuation by emetics and Stomach Tube, Tannin and stimulants. Anæsthetics to relieve spasm.*

Strychnine.—*Stomach Tube, Emetics, Potass. Permang., Chloral, Amyl Nitrite. Charcoal ad lib. Acid Tannic, Potass. Brom. (½ ounce in water with 30 grains of Chloral Hydrate). Patient may be kept fully under Chloroform or Ether. Artificial respiration if possible (most important). Saline transfusion.*

Sublimate.—*See* **Hydrargyrum.**

Sulphonal.—*Emetics, Stomach Tube, Strong Coffee, Strychnine, Artificial respiration. Patient to remain lying down.*

Sulphuretted Hydrogen.—*Iodised Starch (5% Iodine rubbed into Starch with a little water and dried.)* Inhalation of Chlorine best.

Prolonged inhalation of Sulphuretted Hydrogen, even in as low a concentration as 100 *parts per million, is reputed to induce symptoms of chronic intoxication. Strictly speaking, it is an irritant gas.—Jl. A.M.A. ii./25,*119; *also* **L. W.** *Smith and Co-workers, ibid.* 177.

Tetrachlorethane.—*See Jaundice, Vol. II.*

Tobacco.—*See* **Plants, Unidentified.**

Trional.—*See* **Sulphonal.**

Turpentine.—*Empty stomach by pump or tube or give emetics—Apomorphine if necessary, Mag. Sulph., Demulcent Drinks.*

Verdigris.—*See* **Copper.**

Vermilion.—*See* **Hydrargyrum.**

Vermin Killer.—*As* **Strychnine** *or* **Arsenic,** *q.v.*

Veronal.—*Empty stomach by pump and enemata. Coffee, Strychnine, Artificial respiration, later diuretics.* See also several recent abstracts of poisoning cases under Veronal, p. 818.

Weed Killer.—*See* **Arsenic.**

Weever *and other* **poison fish** *cause intolerable pain. Trawlers should have permanganate lancets on board, Chlorinated Lime, also Gold Chloride injections relieve pain.*—**M. Evans,** *B.M.J. ii./21,*200.

White Precipitate.—*See* **Hydrarg.** *White of Egg freely.*

Zinc Salts.—NOT *stomach tube. Washing Soda. Milk and White of Egg Olive or any innocuous oil. Morphine.*

TREATMENT OF POISONING.—E. B. Leech, L. i./27,452.

Occupational diseases of ear, nose and throat, and their prevention. Anthrax, Lead poisoning, Mercury, Phosphorus, Nitrous fumes, Chlorine ulceration, compressed air illness, glanders.—F. H. Westmacott, B.M.J. ii./25,886.

Electric Shock *as from Live Electric Wire,* also *Lightning Shock and burns. Separate from live wire by catching hold of clothing or by using a good thick layer of cloth (dry) or a newspaper. If necessary cut a live wire with long iron scissors in wood handles. For burns Boric compresses. Raise the head. Artificial respiration. See also Vol. II., Radiology Chapter.*

Whether a shock is fatal or otherwise does not depend upon the voltage (pressure). The amount of current (amperes) which any pressure can force through a body and the path it takes determine whether fatal or not.

A rabbit generally survives 2,000 volts, not because it can stand a larger current through its body than any other animal, but because the skin of a rabbit offers such a high resistance that even 2,000 volts cannot force enough current through to kill it.

On the other hand 20 volts has killed a horse, whether it is the iron shoe held on by steel nails or the frog of the hoof, the fact remains that 20 volts can force enough current through the horse to kill, provided it enters and leaves at the hoofs, where the resistance is very low. Sometimes 200 volts will kill a man, while under other circumstances he would hardly feel it.—A. J. Abraham.

INTRAVENOUS DOSES.

The following are results of our experience, or have been collected from various authentic sources. In general, intravenous injections call for great care. The dose must be small, freely diluted, in isotonic solution and slowly injected.

The therapy in respect of some of the chemicals is entirely new and we should welcome suggestions from clinicians to extend the information given.

Statements in some Medical Journals—especially foreign—as to the amounts of chemicals employed intravenously have sometimes amazed us. We have proceeded on the side of caution in giving limit doses.

We strongly recommend trying half or even quarter doses or less at first, freely diluted, where the method of treatment is new.

The injection of foreign substances into the blood serum is in itself a risky business. Changes in blood pressure, collapse, shock and symptoms bordering on anaphylaxis may occur.—L. i./26,241.

Use a needle having a flat bevel with no shoulder and a sharp point, avoiding the drawn out point which may puncture the further side of the vein, or the lumen may fail to completely enter it.—H. Pritchard, B.M.J. i./27,792.

Intraperitoneal injection for certain drugs, Adrenalin, Pituitrin, Caffeine, Atropine, and Quinine, is stated to be more practical than intravenous injection, and should be used when both rapid and lasting effect is required.—W. H. Zeigler, Jl. A. Pharm. Assoc., Feb. '25,86; C. & D. i./25,462.

CHEMICAL.	AMOUNT.	VOL. OF DILUENT.
Acaciæ Gummi . ..	16 Gm. (or more)	250 Cc. (or more in proportion)
Acriflavine, see **Euflavine**		
Adrenalin..	0·5 Cc. of 1 in 1,000 solution	Usually added to 250 or 500 Cc. Normal Saline—to be given within 20 to 40 mins.
Amiodoxyl Benzoate ..	0·75 Gm. (?)	100 Cc. N. Saline.
Antimonii Oxidum ..	0·0006 Gm.—0·0012 Gm.	1 to 2 Cc. Glyc.+Aq.
Antimonium Tartaratum (Antim. Pot. Tart.)	0·03—0·1 Gm.	3—10 Cc.
Antimonii et Sodii Tartras	0·03—0·1 Gm.	3—10 Cc.
Antitoxins. See Diphtheria, Tetanus, etc., in body of work.		
Arsamin	0·01—0·05 Gm.	1 Cc.
Arsenobenzol	0·3 or 0·4 Gm.	300 Cc.
Bayer 205 '	1 Gm. (?)	10 Cc.
Caffeinæ Sodio-Benz.	0·12 Gm.	5 Cc.
Calcii Chloridum ..	0·25 Gm.	5 Cc.
"Chaulmartin" ..	0·5—1 Cc.	
Choline Hydrochloride..	0·6 Gm.	180 Cc.
Cocainæ Hydrochloridum	Enormous dose necessary—not suited for use in man.	
Colchicine	1/100 grain	Has been tried c. Sod. Iod. & Sod. Salicyl 1 Gm. each in 20 Cc.
Colloidal Copper ..	STRENGTH 1 in 2,000	0·5—1 Cc.
Colloidal Gold	1 in 4,000	5 Cc.
Colloidal Mercury ..	1 in 2,000	5 Cc.
Colloidal Platinum ..	1 in 4,000	5 Cc.
Colloidal Selenium ..	1 in 5,000	1 to 5 Cc.
Colloidal Silver	1 in 2,000	5 Cc.
Coramine	1 Cc.	Undiluted.
Digitalinum Pulv. Pvr.	0·0006 Gm. (1/100 grain)	10 Cc.
Digitoxin	0·00015 Gm. (1/400 grain)	10 Cc.
Emetinæ HCl.	0·03—0·04 Gm. (Rogers)	5 Cc.
Euflavine	0·25 Gm.	50 Cc.

CHEMICAL.	AMOUNT.	VOL. OF DILUENT.
Ephedrine HCl.	½ grain (?)	5 Cc.
Ether for Anæsthesia	5% in N. Saline	*v. p.* 105.
Eusol	50 Cc.	
Ferri Cacodylas	0·06 Gm.	5 Cc.
Gentian, Violet	0·2 Gm.	80 Cc.
Glucose	(in 5% solution)	500 Cc. or more
Hexamine	1½ Gm. increased.	10 Cc.
Hexamine with Sodium Iodide 1 Gm.	1·5 Gm.	20 Cc.
Hydrargyri Cyanidum	0·012 Gm. (1/5 grain) Many (female) patients could stand twice the amount.—J. E. Lane, L. ii./21,796.	1·2 Cc.
Hydrargyri Iodidum (c. Sodii Iodid. *q.s.*)	0·005 Gm. (Larger quantities in less	5 Cc. vol. have also been given)
Hydrargyri Oxycyanidum	0·005 Gm. (1/12 gr.) (0·012 Gm. *i.e.*, 1/5 gr. has also be	5 Cc. in 1·2 Cc. (20 minims) en given)
Hydrargyri Perchloridum	0·002 Gm. (1/32 grain) (Larger quantities in less	5 Cc. vol. have also been given)
Indigo Carmine	0·1 Gm.	10 Cc.
Iodi Tinctura Mitis (Off.)	1·2 to 2 Cc. We suggest less to try)	10 Cc. N. Saline (Baillie, L. i./19,423)
Lobelin Ingelheim	0·003 Gm.	
Locke's Solution	500 Cc.	more or less
Magnesium Sulphate	1·0 Gm.	10 Cc.
Mannitol-Quinine	1 Cc.	20 Cc., but clinical data awaited.
Mercurome	0·05 Gm. (?)	10 Cc.
Novarsenobenzol	0·6 Gm. or 0·6 Gm.	10 Cc. 120 Cc.
Oleum Chaulmoogræ	(See page 608), give Sod.	Chaulmoog. in pref.
Orange Juice	10 Cc.	Neutralised with NaOH and diluted to 50 Cc.
Paraldehyde	5 to 15 Cc.	150 Cc.
Peptone	*Graded doses as follows:* 0·3, 0·5, 0·7, 0·9, 1·1, 1·3 Cc. and 4 doses of 1·5 Cc. (Further doses, 3 of 2 Cc., 3 of 2·5 Cc.)	5% Solution, neutralised (For asthma a 7½% Solution is given *intramusc.* *v. p.* 669.)
Peptone	8—10 Cc. increased by 2 Cc. every other day until 18—20 Cc. given	10% Solution, neutralised. (For septicæmia)
Phenolsulphonephthalein	6 mgr.	2 Cc.
Quinidinæ Hydrochloridum Acidum	0·3 Gm. to 0·6 Gm.	5 to 10 Cc.
Quininæ Hydrobromidum Acidum	0·5 Gm.	10 Cc.
Quininæ Hydrochloridum Acidum	0·25 to 0·6 Gm.	10 to 20 Cc
Quinine-Urethane	1 Cc. divided	
Ringer's Solution	500 Cc. (more or less)	
Saccharum	10·3% (isotonic)	
Sanocrysin	0·125 Gm (?)	(?)
Selenium, *See* **Colloidal**		
Silver Salvarsan	0·1 Gm.	10 Cc.

CHEMICAL.	AMOUNT.	VOL. OF DILUENT.
Sodii Bicarbonas ..	Coma has been treated with a litre of 3 to 5% solutions in portions. 1·35% is isotonic	
Sodii Bromidum ..	1 Gm.	10 Cc.
Sodii Cacodylas	0·05 Gm. (massive amounts, even 3 Gm. in 5 Cc. are mentioned.	1 Cc.
Sodii Chaulmoogras ..	0·03—0·06 Gm.	1 to 2 Cc.
Sodii Chloridum ..	0·9%	500 Cc. (more or less)
Sodii Cinnamas	0·1 Gm.	10 Cc.
Sodii Citras	0·4 Gm.	10 Cc. added to blood in transfusion.
Sodii Glycerophosphas	0·2 Gm. (increased)	5 Cc.
Sodii Iodidum	1 Gm. (Larger amounts in the same vol. are mentioned)	20 Cc.
Sodii Iodidum **Sodii Salicylas** }	1 Gm. of each	20 Cc.
Sodii Morrhuas	0·06—0·12 Gm. (This to follow course of subcutaneous injections)	2 to 4 Cc.
Sodii Salicylas	1 Gm.	20 Cc. also 3 Cc. increased of 20 to 40% for varicose veins.
Sodium Tetra - brom. and Tetraiodophenol Phthalein	*not advised*	
Sodii Thiosulphas (Hyposulphis) . ..	0·3 to 0·6 Gm.	5 Cc.
Strontii Salicyl	0·05 Gm.	10 Cc.
Strophanthin	¼ to 1 mgr.	10 Cc.
Sulfarsenol	0·06 Gm.	10 Cc. or more
T.A.B. Vaccine	10-250 mills.	1 Cc.
Tryparsamide	3 Gm.	10 Cc.
Tylcalsin	0·5 to 1 Gm.	10 to 20 Cc.
Urea-Stibamine	0·1 Gm. incr.	2 Cc.
Vaccines & Sera	*See* Individual Items.	

PROPORTIONAL DOSE TABLE ACCORDING TO AGE (*Gaubius*).

For an adult suppose the dose to be	1 or 60 grains.
Under 1 year will require	$\frac{1}{12}$,, 5 ,,
,, 2 ,, ,,	$\frac{1}{8}$,, 8 ,,
,, 3 ,, ,,	$\frac{1}{6}$,, 10 ,,
,, 4 ,, ,,	$\frac{1}{4}$,, 15 ,,
,, 7 ,, ,,	$\frac{1}{3}$,, 20 ,,
,, 14 ,, ,,	$\frac{1}{2}$,, 30 ,,
,, 20 ,, ,,	$\frac{2}{3}$,, 40 ,,
21 to 60, the full dose, or	1 ,, 60 ..

Above this age, an inverse gradation must be observed.

Young's Formula.—For children under 12, add 12 to the age, and divide the age by the amount thus obtained; thus for 8 years $\frac{8}{8+12} = \frac{2}{5}$ of adult dose.

Prof. W. J. Dilling says Young's and Gaubius' methods are of little value. The best formula after the 10th year is to multiply the adult dose by $\frac{\text{age} \times 5}{100}$ or by $\frac{\text{age.}}{20}$ This he found gave a curve which when plotted out coincides more closely than other systems with the curve obtained by plotting out the percentages of adult weight at ages obtained from birth to 21 years, which he considers is the average adult age. The new formula, he states, results in doses which correspond closely with those demanded—B.M.J. ii./19,1177.

INDEX & POSOLOGICAL TABLE.

THIS index supplies the name *in Latin* as far as possible and adult dose (if used internally) of most of the drugs and preparations described. The doses are based on personal experience, or are culled from the best authorities.

Official names are printed in *italics*.

For **Acids** look under the word **Acid.**

For **Salts,** *vide* **Latin name** of the **base.**

For **Effervescent Preparations,** see list under the word **Effervescent.**

Some items, *e.g.*, some Official Medicamenta and Pilulæ have **purposely no page**—*i.e.*, they are not further described in the book.

Customary CONTRACTIONS have been found necessary, *e.g.* the following :

Acid. or Ac. = Acidus,-a,-um, etc.
Alc. = Alcoholic.
Alk. = Alkalinus, etc.
Av. = Average (Dose).
Caps. = Capsula, etc.
C. = cum (with).
Co. = Compositus, etc. (or compound.
Conc. = Concentratus, etc.
Eff. = Effervescens, etc.
Emplast. = Emplastrum, etc.
Emuls. = Emulsio, etc.
Expt. = Expectorant.
Extr. = Extractum, etc.
Fluidextr. = Fluidextractum.
Glycerin = Glycerinum, etc.
Glyceroph. = Glycerophosphas, etc.
HBr. = Hydrobromidum, etc.
HCl. = Hydrochloridum, etc.
Hyd. = Hydrargyrum, etc.
Hyp. = Hypodermicus, etc.
Inf. = Infusum, etc.
Inj. = Injectio, etc.
Incr. = Increased.
Linim. = Linimentum, etc.
Liq. = Liquor or Liquidus, etc.
Mag. = Magnesium, etc.
Mang. = Manganesium, etc.
Mist. = Mistura, etc.
Potass. = Potassium, etc.
Quin. = Quinina, etc.
Rad. = Radix, etc.
Rep. = Repeated.
Salicyl. = Salicylas, etc.
Sol. = Solutio, etc.
Spirit. = Spiritus, etc.
Strych. = Strychnina, etc.
Syr. = Syrupus, etc.
Tinct. = Tinctura, etc.
Ung. = Unguentum, etc. or Ointment.
Vin. = Vinum, etc.
'85 = B.P. 1885.

Vide also List of Abbreviations at commencement of the book.

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